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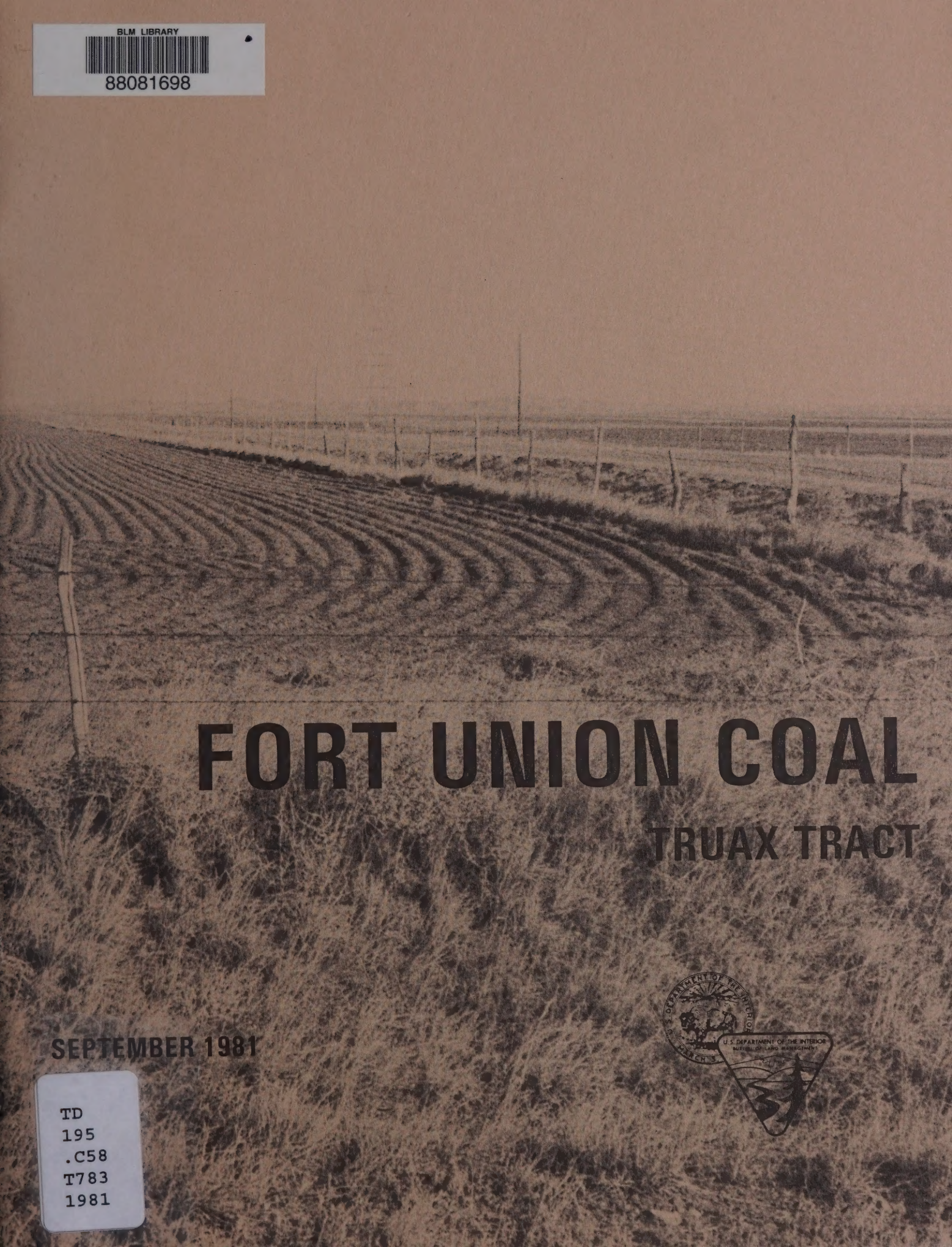

FORT UNION COAL

TRUAX TRACT

SEPTEMBER 1981

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FORT UNION COAL REGION

TRUAX TRACT ANALYSIS

SITE SPECIFIC ANALYSIS

PRELIMINARY FACILITY EVALUATION REPORT

MERCER COUNTY, NORTH DAKOTA

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September 1981

Michael J. Penfold
State Director

PREFACE

This document contains a site-specific analysis and a preliminary facility evaluation report. The site-specific analysis discusses the consequences of leasing and mining a particular tract. The preliminary facility evaluation report discusses significant issues associated with an end use coal conversion facility.

There were 24 tracts identified through a screening process under the over-all direction of the Fort Union Region Coal Team. The team consists of federal, state, and local officials. The tracts are being evaluated for potential federal coal leasing for a coal lease sale scheduled for June 1983. The evaluation, called a site-specific analysis, has been completed for each of the 24 tracts.

Historically, development of a new coal mine in the Fort Union Coal Region has been associated with a coal conversion facility power plant in the vicinity of the mine. For this reason, the Regional Coal Team directed BLM to evaluate impacts of a typical facility near each potential mine. A preliminary facility evaluation report was prepared for each facility.

The Fort Union Regional Coal Team will begin ranking and grouping selected tracts into alternative leasing patterns for the 1983 lease sale using information from these individual reports. These groupings of tracts will form the basis for alternatives and a regional environmental impact statement to be developed during 1982. The analysis in this report represents an important step in a lengthy process which takes place prior to any final decision on federal coal leasing within the region.

Of the 24 tracts currently being evaluated, 16 would require the opening of new mines. One of the 16 would be specifically earmarked for small business. The remaining eight tracts constitute coal which would be needed to maintain production or prevent the by-pass of federal coal at an ongoing mining operation.

Approximately 1.6 billion tons of recoverable federal coal lie within the areas being evaluated. Final designation of some areas as unsuitable for mining under the 1977 Surface Mining Control and Reclamation Act will likely reduce the amount of federal coal actually available for leasing and development, and could remove several of the 24 tracts from further consideration. This information will not be available until early 1982.

A major purpose of the site-specific analysis and preliminary facility evaluation reports is to acquaint the public with key issues and consequences of leasing and development of federal coal reserves so that they may (1) offer comments to the Fort Union Regional Coal Team on what areas they consider most important to be evaluated and analyzed in the ranking of the tracts and in the Regional EIS and (2) offer specific advice on what decision alternatives the Coal Team should look at more closely.

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SITE SPECIFIC ANALYSIS

INTRODUCTION

The purpose of this action is to offer 28.8 million tons of federal strippable coal reserves that can be further considered for coal leasing and development to help meet the energy needs of the nation.

This site-specific environmental analysis has been prepared for the Truax tract (Map 1) in accordance with federal regulations (43 CFR 3420). It will be used by the Fort Union Regional Coal Team to further consider competitive leasing of federal coal within the tract for a June 30, 1983 coal lease sale schedule. If selected and leased, the Truax tract will contribute 28.8 million tons of federal coal to the regional leasing target. Presently, a regional leasing target has not be established by the Secretary of Interior. The preliminary regional leasing target will be established in August 1981 and finalized in October 1981.

BACKGROUND

In September of 1980, the Dickinson District Bureau of Land Management (BLM) Office completed the West-Central North Dakota Management Framework Plan (MFP) for Oliver, Mercer, McLean, Stark, and Dunn counties and a small part of Billings County. The land use planning process included identification of high or moderate potential coal areas, application of unsuitability criteria, identification of resource trade-offs, and consultation with surface owners. As a result of that work, areas were identified that could be further considered for coal development. These areas are available for consideration of new competitive leasing, lease exchanges, and lease modifications.

Following land use planning, BLM requested expressions of interest from industry. These expressions, along with other information, guided the U.S. Geological Survey (USGS) in delineating this tract. Results of that work are summarized in this document.

The BLM Dickinson District Staff inventoried the tract to determine the site-specific resource values and then analyzed potential environmental effects of coal development on this tract. Among other things certain of the unsuitability criteria were further considered. Any new findings are reflected in this report.

Information from this and other site-specific analyses (SSAs) will be used by the Regional Coal Team during the tract ranking and selection process for a lease sale schedule. The proposed tracts will be cumulatively analyzed in a regional environmental impact statement. Among the alternatives addressed will be different combinations of tracts that meet a regional coal leasing target.

After reviewing the analytical documents, public comments, and the recommendations of the Regional Coal Team, the Secretary of the Interior will select specific tracts for the lease sale. The successful lessee will be required to submit a plan for mining and reclamation to the Office of Surface Mining (OSM) for review and approval within three years after leasing. In evaluating the plan, OSM will prepare a site-specific environmental assessment or EIS.

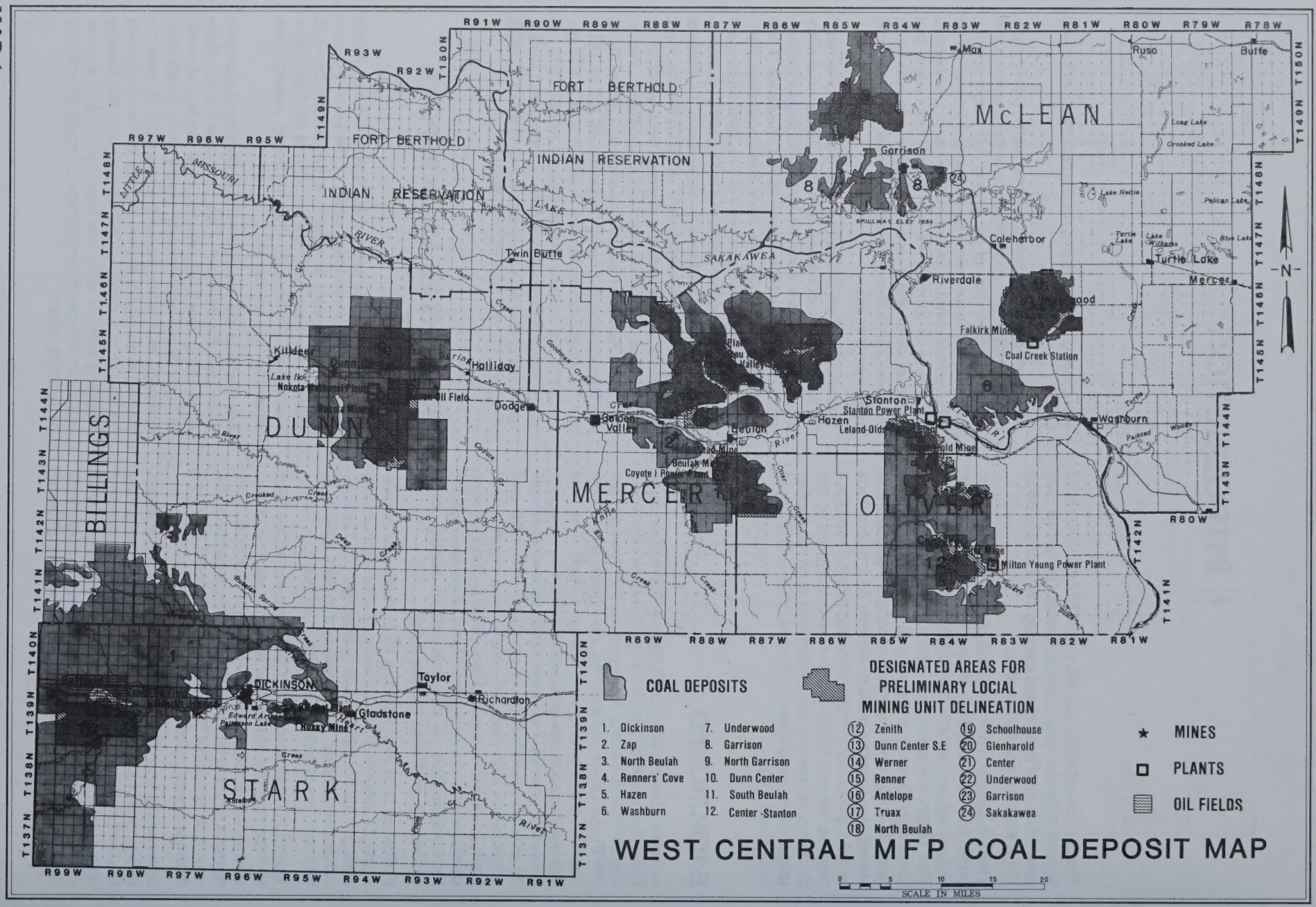
Tracts in the Fort Union Region are being considered for leasing in accordance with the federal coal management program adopted by the Secretary, Department of the Interior, in June 1979. The basis of the program was, in part, the Final Environmental Statement, Federal Coal Management Program. Implementation procedures are contained in Federal Regulations (43 CFR 3400). Authorizing actions are the Mineral Leasing Act for Acquired Lands of 1947, as amended; the Federal Land Policy and Management Act of 1976; the Surface Mining Control and Reclamation Act of 1977; the Multiple Mineral Development Act of 1954; the Department of Energy Organization Act of 1977; the National Environmental Policy Act of 1969; the Federal Coal Leasing Amendments Act of 1976, as amended; and Federal Regulations concerning federal coal leasing and development including 43 CFR 3400; 30 CFR 211; and 30 CFR 700-899.

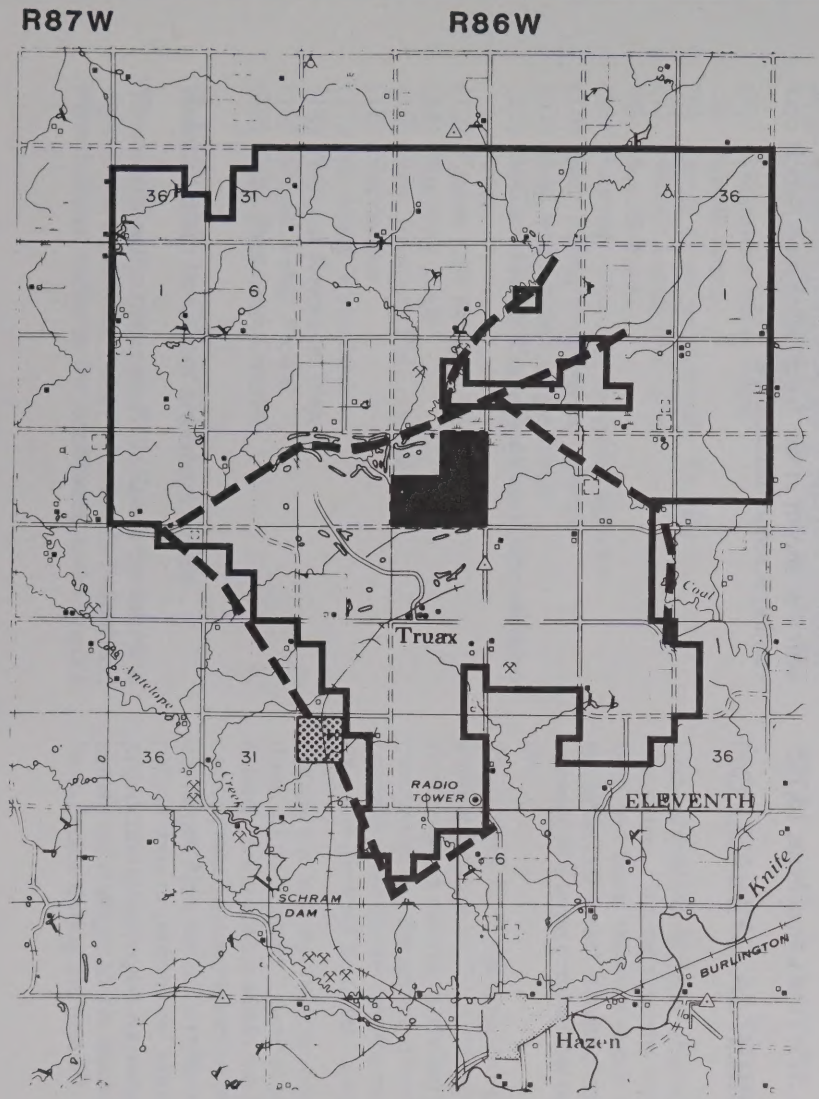
TRACT DELINEATION REPORT SUMMARY

The Truax tract is located in Mercer County, North Dakota about three miles north of the town of Hazen (Map 1). The tract is based on the Beulah-Zap bed found in the Sentinel Butte Member of the Fort Union Formation (Paleocene). No geologic hazards are known to exist on this tract.

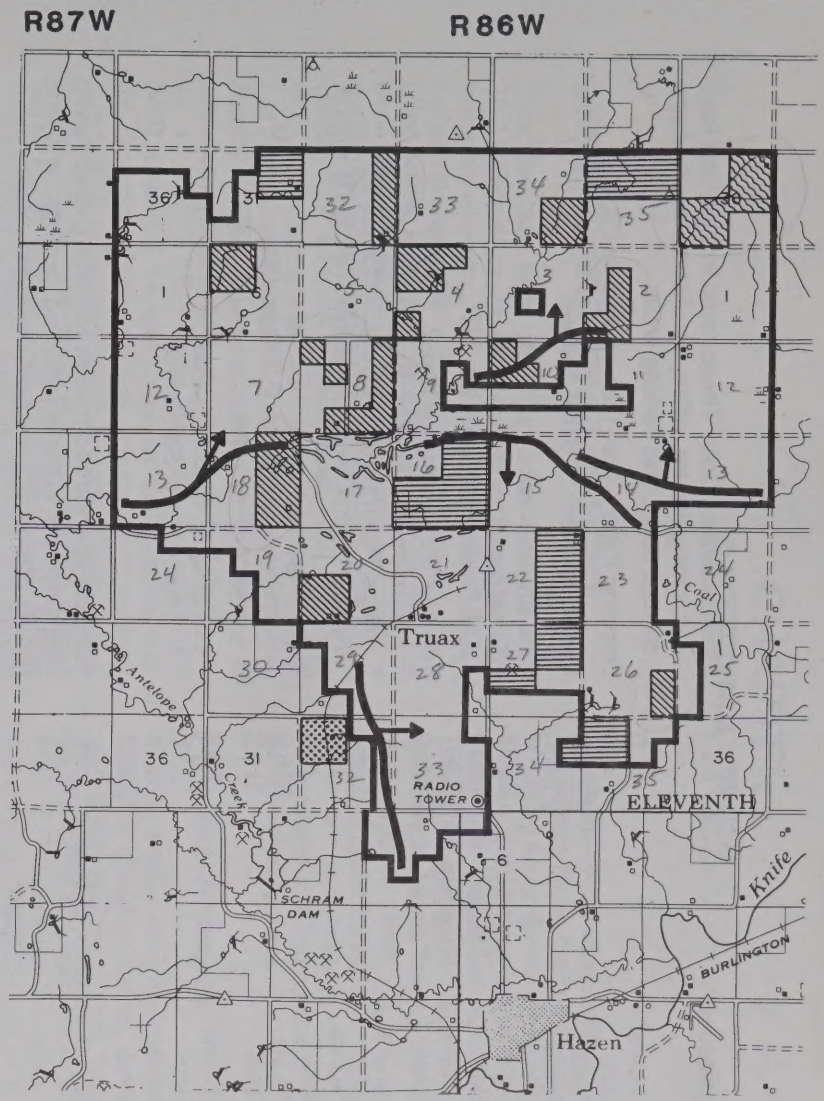
For analytical purposes, the USGS developed a generic mine plan for this tract. This plan calls for a surface mine using draglines, electric coal loading shovels, bottom dump coal haulers, rotary drills, bulldozers, scrapers, and other support equipment. A possible mining sequence is shown on Map 2. The coal would be mined to a depth of 200 feet or until the limiting stripping ratio of 20:1 has been reached. The most probable end-use of the coal would be a on-site electric generating station.

MAP 1


WEST CENTRAL MFP COAL DEPOSIT MAP
COAL DEPOSITS
DESIGNATED AREAS FOR PRELIMINARY LOCAL MINING UNIT DELINEATION
1. Dickinson
2. Zap
3. North Beulah
4. Renners' Cove
5. Hazen
6. Washburn
7. Underwood
8. Garrison
9. North Garrison
10. Dunn Center
11. South Beulah
12. Center -Stanton
(12) Zenith
(13) Dunn Center S.E
(14) Werner
(15) Renner
(16) Antelope
(17) Truax
(18) North Beulah
(19) Schoolhouse
(20) Glenharold
(21) Center
(22) Underwood
(23) Garrison
(24) Sakakawea
MINES
PLANTS
OIL FIELDS
SCALE IN MILES
0 5 10 15 20
N
BILLINGS
DUNN
MERCER
OLIVER
STARK
McLEAN
FORT BERTHOLD INDIAN RESERVATION
LAKE SAKAKAWEA
MISSOURI RIVER
Killdeer
Halliday
Dodge
Golden Valley
Beulah
Hazen
Stanton
Stanton Power Plant
Leland-Olds
Washburn
Coleharbor
Riverdale
Falkirk Mine
Coal Creek Station
Garrison
Max
Ruso
Butte
Turtle Lake
Mercer
Twin Butte
Coyote I Power Plant
Milton Young Power Plant
DICKINSON
Gladstone
Taylor
Richardton
Husky Mine
R99W R98W R97W R96W R95W R94W R93W R92W R91W R90W R89W R88W R87W R86W R85W R84W R83W R82W R81W R80W R79W R78W
T150N T149N T148N T147N T146N T145N T144N T143N T142N T141N T140N T139N T138N T137N



SURFACE OWNERSHIP



SUBSURFACE OWNERSHIP

TRUAX TRACT

LEGEND

- Tract Boundary
- Federal Coal(100%)
- Federal Coal (Less than 100%)
- State Coal
- Private Coal
- State Surface
- Private Surface
- Surface Facilities
- Out-of-Pit Haul Roads
- Pit Advancement

1 0 1 2 3 4 5 6

Scale In Miles

MAP 2

Specific Tract Characteristics:

Acreage:

Surface:	Federal	0
	State	480
	Private	22,980
	Total:	23,460
Subsurface:	Federal	2,233
	State	1,840
	Private	19,387
	Total	23,460

Coal Reserves/Millions of Tons:

In Place:	Federal	32.0
	State	26.3
	Private	256.0
	Total	314.3
Recoverable:	Federal	28.8
	State	23.6
	Private	230.4
	Total:	282.8

Coal Quality: Average of samples as received from vicinity of tract:

Moisture	36.1%
Volatile matter	27.2%
Fixed carbon	30.5%
Ash	6.2%
Sulfur	0.82%
BTU's/lb	6,919

Surface Disturbance/acres

Mining: Annual rate, 375; Total Life of Mine, 18,765

Haul Roads: 198

Mine Facilities: 160 - These could include coal load-out, changehouse, office, warehouse, repair shops, storage areas, and parking areas.

Stripping Ratio: Less than or equal to 20:1

Coal Thickness: 9.6 feet average.

Mine Employment:
Construction - 180
Full Production - 180

Royalties and Severance Taxes:
Annual Federal Royalty, $0.43 million
Annual North Dakota Royalty, $0.35 million
Annual North Dakota Severance Tax, $5.04 million

Water Needs:
Human Consumption, 6,000 gal./day
Source: Well water

Nonpotable, 60,000 gal./day
Source: Lake Sakakawea

For more specific information on the proposed mining operation refer to the engineering, geologic, and land reports prepared by the tract delineation team.

NOTE: As the mine plans developed by USGS are of a generic nature and the actual mining sequence will be developed by the mining companies to fit their individual needs, the Resource Specialist assigned to the SSAs made the assumption that all lands within the tract boundaries would be disturbed to some degree. Therefore, acreage in the SSA may not always agree with that shown in the Tract Delineation Report concerning acreage disturbance.

CHAPTER I
ALTERNATIVES

LEASING AND DEVELOPMENT

This alternative is to offer, for further consideration, 28.8 million tons of federal coal in the Truax tract for competitive leasing. This tract has been identified as a logical mining unit for a 5.6 million ton per year surface mine having a 50 year mine life. The Truax tract has been delineated within areas designated as acceptable for further consideration in the West-Central North Dakota MFP adopted in September 1980. The tract does not include any lands for which the surface owner has filed a valid refusal to consent (to mining) prior to March 1, 1981. The tract has been fully cleared of unsuitability criteria numbers 1, 2, 4, 5, 6, 7, 8, 10, 11, 12, 13, 16, 17, 18, 19, and 20 as defined in 43 CFR 3461. Criteria 9, 14, and 15 require further study. With the exception of criterion 3, all unsuitability criteria studies will be completed and fully applied before work begins on the final regional environmental impact study; if not, this tract will be dropped from further consideration. Criterion 3 will be deferred until mining and reclamation plans are submitted to OSM and North Dakota Public Service Commission for final approval. Current unsuitability concerns are shown on Map 3. The following is a list of unsuitability criteria.

(1) Federal Land System
(2) Rights-of-Way and Easements
(3) Buffer Zones along R/W and Adjacent to Communities and Buildings
(4) Wilderness Study Areas
(5) Scenic Areas
(6) Lands Used for Scientific Studies
(7) Historic Lands and Sites
(8) Natural Areas
(9) Federally Listed Endangered Species
(10) State Listed Endangered Species
(11) Bald and Golden Eagle Nests
(12) Bald and Golden Eagle Roost and Concentration Areas
(13) Falcon Cliff Nesting Sites
(14) Migratory Birds
(15) State Resident Fish and Wildlife
(16) Floodplains
(17) Municipal Watersheds
(18) National Resource Waters
(19) Alluvial Valley Floors
(20) State Proposed Criteria

Relationship to Other Developments

The nearest active mines are Knife River's Beulah Mine eight miles southwest, North American's Indianhead Mine fourteen miles to the southwest, and Consol's Glenharold Mine which is fifteen miles east of the tract. In addition, Basin Electric Cooperative is currently constructing two units for the Antelope Valley Generating Station (AVS) located about eight miles west of the tract. This project will be supplied by the proposed Coteau Properties mine to be developed adjacent to the generation station. This mine is also expected to supply the proposed Great Plains Coal Gasification project which is under construction adjacent to the AVS. Also there are two existing electric generating stations located about fifteen miles east of the tract adjacent to the Glenharold mine.

Mitigation Measures

This alternative assumes that proper mining and reclamation would be carried out according to existing state and federal regulations. These include: OSM Reclamation and Enforcement regulations (30 CFR 700-899), Environmental Protection Agency regulations (40 CFR 0-1399), Council of Environmental Quality regulations (40 CFR 211), Department of Interior coal management regulations (43 CFR 23 and 3400), and North Dakota Public Service Commission laws and regulations (Chapter 38-14.1 of the North Dakota Century Code and Article 69-05.2 of the North Dakota Administrative Code).

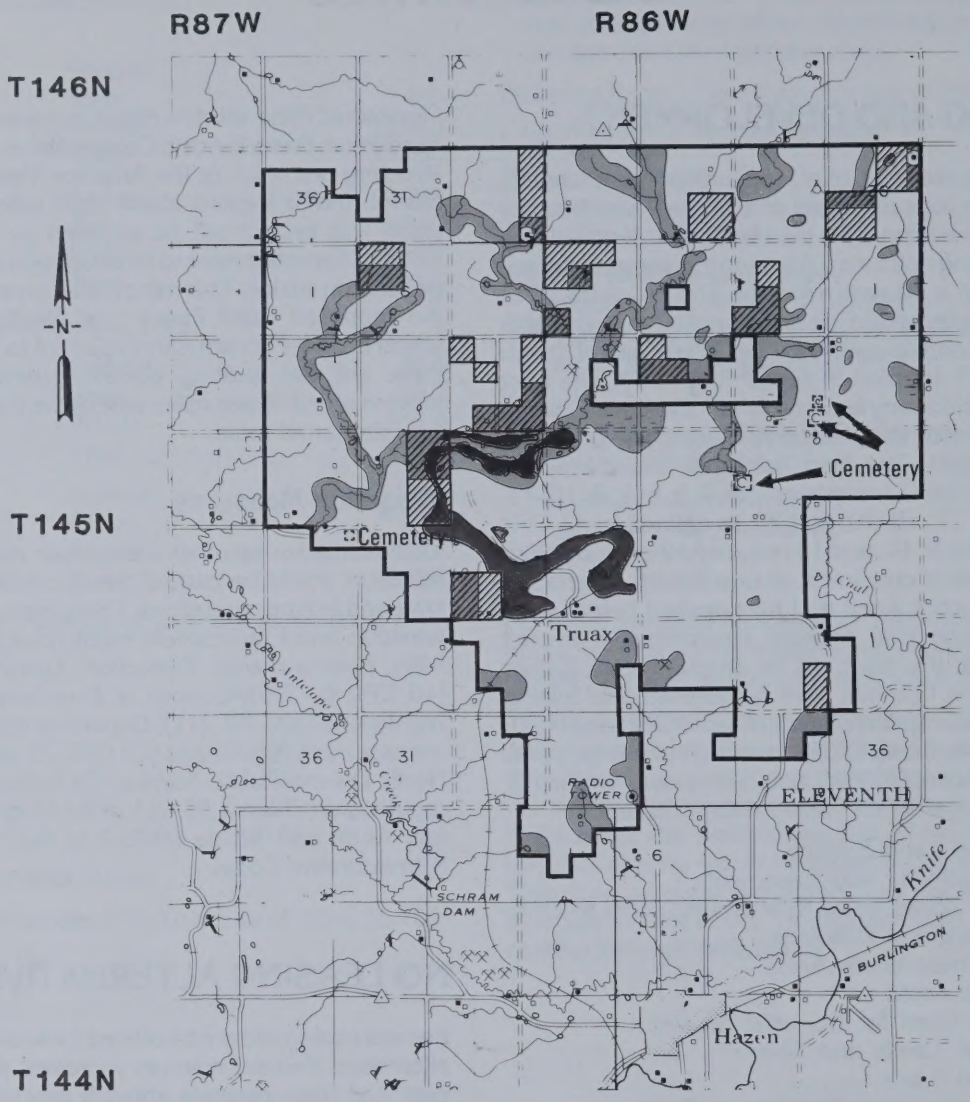
NO LEASING ALTERNATIVE

Federal coal would not be offered for leasing under this alternative. Federal reserves represent about 10 percent and State reserves about 8 percent of the coal available in the tract. If federal coal is not leased, development of a large economical mining unit is not feasible.

There were no small business expressions of leasing interest for the area. Considering the amount of federal coal involved, the checkerboard pattern of federal coal ownership, and the apparent trend in small mine development, near future development of any small coal mines in the tract boundary is not likely.

Should the tract not be considered for further leasing, there would be about 2 percent or 28.8 million tons less federal coal available within the Fort Union Region for consideration in tract selection to meet the federal leasing target. Also, about 24 million tons of state and 230 million tons of private coal would be lost for possible production in the region. As discussed in Chapter II, few significant changes to the existing environment would be expected during the next 50 years.

TRUAX TRACT



LEGEND

Federal Coal

Mined Out Areas

Areas being considered as unsuitable by BLM and others based on existing information.

Wildlife Habitat

Potential Dwellings

Note: Detailed maps are available for inspection at the Dickinson BLM District Office. (Rights-of-way too numerous to show.)

MAP 3

CHAPTER II
AFFECTED ENVIRONMENT

This section is a description of the current environment with anticipated changes from ongoing trends. Within the Williston Basin there has been an increase in oil and gas exploration and this trend is expected to continue. The physical resources described in this section represent only existing conditions while the social and economic sections account for existing conditions and ongoing trends. It is recognized that the physical resource values may change due to future oil and gas exploration.

TOPOGRAPHY

This tract lies within the Missouri Plateau portion of the Great Plains Physiographic Province. Most of the tract consists of rolling, well-drained topography with till and loess veneering preexisting landforms. Small areas of steep slopes underlain by bedrock, except for local patches of till and most dissected highlands, lie within the rolling terrain. The tract is bordered on the north and west by the Krem Moraine which consists of hummocky topography with sharp, small hills of till and numerous closed depressions.

GEOLOGY AND MINERALS

The Sentinel Butte Member of the Paleocene Fort Union Formation forms the bedrock exposures in this tract. The member is about 500 feet thick and consists of yellow-brown to gray, fine to medium grained sandstone; interbedded gray and brown clay and siltstone; gray bentonite clay bed; and lignite beds. Unconformably overlying bedrock in some areas are surficial deposits of Pleistocene and Holocene age.

The Beulah-Zap bed is considered to be the only mineable coal bed in this tract. It averages about 9.6 feet thick. The total tonnage of coal in place is approximately 314.3 million tons (32.05 million tons federal, 256.0 million tons private, and 26.3 million tons state).

No oil is produced from this tract at this time but there is a small chance for future production since the tract is located in the Williston Basin.

PALEONTOLOGY

No fossils of scientific importance are known to exist on this tract.

SOILS AND RECLAMATION POTENTIAL

Most of the Truax tract is composed of soils derived from glacial till parent material (Williams, Bowbells). The remainder is made up of soils from alluvium (Arnegard, Belfield, Grail, Harriet) and shale and siltstone parent material (Cabba). The dominant soils are primarily deep, loamy, well drained and of medium to high fertility.

Slopes over this tract are generally quite gentle. The soil mapping units with steeper slopes seen on Table 2 are primarily along breaks into drainageways (Zahl, Cabba).

The Williams and Bowbells mapping units which dominate this tract have a rather low erosion potential. Water erosion potential is high, however, on mapping units with steeper slopes (Table 1).

The quality of soil in the tract is reflected in the soil suitability for cover of surface-mined land. The ratings and acreage figures reflecting that suitability are for the Soil Conservation Service (SCS) Order II county soil survey mapping units in this tract (Tables 1 and 2, Chapter 2). Of the 23,441 acres involved, 17,960 acres (77%) are in the "good" suitability category, 4,006 acres (17%) "fair," and 1,475 acres (6%) "poor." Williams and Bowbells mapping units compose much of the acreage rated "good." Belfield and Cabba units dominate the "fair" category. About 900 of the 1,475 acres rated "poor" are Ustorthents or mine spoils from previous coal mining activity. Most of the remaining acreage in this category is comprised of Harriet mapping units.

The suitability data in Table 2 is developed by surface landowners because North Dakota law does not allow the transfer of soil material from one landowner to another unless written consent is given. Each surface owner's land must be reclaimed with soil originally removed from his holdings. The table therefore indicates the degree of difficulty in reclaiming individual landowner holdings based on soil suitability for cover of surface-mined land.

HYDROLOGY

Surface water drains from this tract through Raymond Creek, Coal Creek and Antelope Creek to the Knife River. Annual runoff in this area averages about one inch. Table 3 shows the percentage of these

TABLE 1
SOILS - TRUAX TRACT

Map Symbol and Soil Mapping Unit Name[1/]	Percent Slope[1/]	Soil Erosion Potential[1/] Wind	Water	Overall Suitability of Soil for Use as Cover-Soil Material in Surface-Mine Reclamation[2/]	Soil Hazard Conditions[2/]
1 - Parnell silt loam	0-1	Low	Low	Good	----
2 - Tonka silt loam	0-1	Low	Low	Good	----
5 - Dimmick silty clay	0-1	Low	Low	Poor	Too clayey
8 - Grail silty clay loam	1-3	Low	Low	Fair	Too clayey
8B - Grail silty clay loam	3-6	Low	Mod	Fair	Too clayey
9C - Regent silty clay loam	6-9	Low	High	Fair	Too clayey
17 - Heil silty clay loam	0-1	Low	Low	Poor	Too clayey, excess sodium
35C - Armor-Werner loams	6-9	Low-Mod	Mod	Good	----
36 - Williams loam	1-3	Low	Low	Good	----
36B - Williams loam	3-6	Low	Low	Good	----
36C - Williams loam	6-9	Low	Mod	Good	----
38C - Williams-Zahl loams	6-9	Low-Mod	Mod	Good	----
38D - Zahl-Williams loams	9-15	Low-Mod	High	Fair	Too clayey, some lime
38E - Zahl loam	15-15	Low-Mod	High	Fair	Too clayey, some lime
41B - Parshall loam	1-6	Mod	Low-Mod	Good	----

TABLE 1
SOILS - TRUAX TRACT

Map Symbol and Soil Mapping Unit Name[1/]	Percent Slope[1/]	Soil Erosion Potential[1/] Wind	Water	Overall Suitability of Soil for Use as Cover-Soil Material in Surface-Mine Reclamation[2/]	Soil Hazard Conditions[2/]
43 - Colvin silt loam	0-1	Mod	Low	Fair	Too alkaline, some lime
44 - Arnegard loam	1-1	Low	Low	Good	----
44B - Arnegard loam	3-6	Low	Mod	Good	----
51 - Straw silt loam	0-1	Low	High	Good	----
55C - Vebar fine sandy loam	6-9	High	High	Good	----
57B - Flaxton fine sandy loam	1-6	High	Mod	Good	----
58B - Flaxton-Williams complex	3-6	Mod-High	Low	Good	----
59B - Parshall fine sandy loam	1-6	High	Low	Good	----
67 - Straw soils, channeled	0-1	Low	High	Good	----
71B - Searing loam	1-6	Mod	Low	Good	----
71C - Searing-Ringling loams	6-9	Mod	Mod	Fair	Ringling-excess rock fragments
75 - Belfield-Daglum silt loams	1-3	Low-Mod	Low	Fair	Clayey subsoil with sodium & salts
75B - Belfield-Daglum silt loams	3-6	Low-Mod	Mod	Fair	Clayey subsoil with sodium & salts

TABLE 1
SOILS - TRUAX TRACT

Map Symbol and Soil Mapping Unit Name[1/]	Percent Slope[1/]	Soil Erosion Potential[1/] Wind	Water	Overall Suitability of Soil for Use as Cover-Soil Material in Surface-Mine Reclamation[2/]	Soil Hazard Conditions[2/]
75C - Belfield-Daglum silt loams	6-9	Low-Mod	High	Fair	Clayey subsoil with sodium & salts
77 - Bowdle loam	1-3	Mod	Low	Good	----
79B - Moreau silty clay	3-6	Mod	Mod	Poor	Too clayey, some sodium in subsoil
79C - Moreau silty clay	6-9	High	High	Poor	Too clayey, some sodium in subsoil
81D - Cabba loam	9-15	Mod	High	Fair	Too alkaline, some lime
81E - Cabba loam	15-35	Mod	High	Fair	Too alkaline, some lime
85 - Harriet Variant silt loam	0-1	Mod	Low	Poor	Excess sodium and salts
86E - Wabek soils	3-25	Mod-High	High	Poor	Excess small stones, droughty, sandy subsoil
87C - Rhoades-Daglum complex	1-9	Low	Mod	Poor	Too clayey, excess sodium & salts
88 - Harriet clay	0-1	High	Low	Poor	Too clayey, excess sodium & salts
89E - Ustorthents	0-100	Highly Variable	High	Poor	Too clayey & alkaline, excess sodium
90C - Williams loam, mine sink	1-9	Low	Low	Poor	Danger of collapse if removal attempted

TABLE 1
SOILS - TRUAX TRACT

Map Symbol and Soil Mapping Unit Name 1/	Percent Slope 1/	Soil Erosion Potential 1/ Wind	Water	Overall Suitability of Soil for Use as Cover-Soil Material in Surface-Mine Reclamation 2/	Soil Hazard Conditions 2/
92B - Noonan-Williams loams	1-6	Low	Mod	Fair	Noonan-excess sodium
93 - Falkirk loam	1-3	Low	Low	Good	----
94 - Makoti silt loam	0-1	Low	Low	Good	----
95 - Flaxton-Williams loams	1-3	Mod	Low	Good	----
97C - Sen silt loam	6-9	Low	High	Good	----
98E - Ringling-Cabba complex	9-35	Mod	High	Poor	Ringling-excess rock fragments; Cabba-too alkaline, some lime
102 - Bowbells loam	1-3	Low	Low	Good	----
108 - Belfield - straw silt loams	1-3	Low	Low	Fair	Belfield-clayey subsoil with some sodium, salts
109B - Bowbells - Zahl loams	3-6	Low-Mod	Low-Mod	Good	----
110B - Belfield silt loam	3-6	Low	Mod	Fair	Clayey subsoil with some sodium, salts

1/ From "Soil Survey of Mercer County, North Dakota"

2/ Derived by applying the properties of the soils within the tract which are described in the aboved mentioned soil survey report and "Official Soil Series Descriptions" to the guidelines developed by BLM-Montana State Office and adapted from information by Wm. Schafer, the Soil Conservation Service (SCS) and the Office of Surface Mining (OSM).

TABLE 2
SUITABILITY OF SOIL FOR RECLAMATION BY
LANDOWNER IN THE TRUAX TRACT

LANDOWNER NUMBER	ACRES GOOD	FAIR	POOR	TOTAL
1	150	86	4	240
2a	149	10	1	160
b	252	66	2	320
c	282	37	1	320
d	153	6	1	160
4a	42	38	-	80
b	29	11	-	40
5	146	14	-	160
7a	55	-	-	55
b	169	7	75	320
8	71	89	-	160
9	322	77	1	400
10	66	-	-	66
11	40	-	-	40
12	80	-	-	80
13	72	-	-	80
14	38	2	-	40
15	159	-	1	160
16	144	1	5	160
17a	355	45	-	400
b	66	54	-	120
19	162	38	-	200
21	24	16	-	40
22a	94	21	45	160
b	66	1	13	80
24	356	124	-	480
25	37	43	-	80
26	160	-	-	160
28	559	8	-	640
29	298	22	-	320
31	320	-	-	320
33	159	-	1	160
35a	159	1	-	160
b	167	31	2	200
c	40	-	-	40
d	80		-	80
36a*	19	9	52	80
b	135	25	-	160
c	259	88	13	360
d	100	60	-	160
37a	75	5	-	80
b	287	1	32	320
38a	34	6	-	40
b	37	38	5	80
39	224	176	-	400
40	475	5	-	480
41	208	72	-	280
42	289	31	-	320
43	190	10	-	200
44	160	-	-	160
45	80	-	-	80
46a	160	-	-	160
b	102	5	13	120
c	32	8	-	40
d	160	-	-	160
47a	101	59	-	160
b	228	89	3	320
49	160	-	-	160
50a	22	13	5	40
b	214	6	20	240
51	372	100	8	480
52	80	-	-	80
53	212	28	-	240
54a	110	10	-	120
b	159	1	-	160
55a	106	14	-	120
b	160	-	-	160
56	75	5	-	80
57	40	-	-	40
58a	80	-	-	80
b	158	2	-	160
c	80	-	-	80
59a	66	14	-	80
b	34	6	-	40
c	102	54	4	160
d	80	-	-	80
61a	80	-	-	80
b	40	-	-	40
63	154	6	-	160
64	163	283	34	480
65a	65	15	-	80
b	18	2	-	20
66	298	-	22	320
67	505	55	-	560
68a	73	7	-	80
b	203	37	-	240
69	357	43	-	400
71	160	-	-	160
72	137	23	-	160
74a	56	24	-	80
b	128	6	26	160
c*	8	27	45	80
d	150	81	9	240
e	80	-	-	80
77a	259	88	53	400
b	80	-	-	80
78	72	6	2	80
79a	68	12	-	80
b	287	33	-	320
80a	160	-	-	160
b	105	40	15	160
81	147	13	-	160
82	344	16	-	360
83a	77	-	3	80
b	67	76	17	160
c	44	82	34	160
85	158	2	-	160
86a	149	11	-	160
b	80	-	-	80
c	80	-	-	80
d	20	-	-	20
88	88	25	7	120
89	58	22	-	80
91a	160	-	-	160
b	244	131	25	400
c	957	411	872	2240
d	125	31	4	160
92	71	9	-	80
95	80	80	-	160
96	119	361	-	480
TOTALS	17,960	4,006	1,475	23,441
% OF TOTAL	77%	17%	6%	100%

1/ Based on Table 1. Planimetry by Bureau of Land Management. Legal descriptions of land and owner name corresponding to landowner number available at Dickinson District Office.
*Indicate individual landowner tracts that have nearly half or more of the acreage rated "poor" for use as cover-soil material in surface mine reclamation.
**The acres rated "poor" are almost all mine spoils from old mining activity.

watersheds covered by the tract and additional areas disturbed by facilites, haul roads, etc. Also shown are estimates of annual water yields.

TABLE 3
WATERSHED AREAS ON THE TRUAX TRACT

Watershed	Area (miles²)	% of Watershed to be Disturbed	Annual Water Yield (acre-feet)
Raymond Creek	36	10	1,920
Coal Creek	20	62	1,067
Antelope Creek	116	26	6,187
Knife River Direct Trib.	7	13	373

The surface water is typically a sodium bicarbonate—sulfate type. Surface water use within the affected area includes stock watering and some wildlife purposes.

The Fox Hills, Basal Hell Creek, Upper Hell Creek, and Lower Ludlow are regional aquifers that occur beneath this tract. There is no detailed information that shows how extensive the Beulah-Zap lignite may be as an aquifer in this area.

The lignite outcrops on all sides of the area well above the surrounding major surface waters and buried valleys. The streams that drain the tract have only a limited amount of baseflow. In the northern portion of the tract are wetlands and sloughs with poorly defined drainage patterns. Based on these conditions, the Beulah-Zap bed is probably only partially saturated on a seasonal basis. The flow system is recharged locally and the water table probably reflects topographic control. Discharge is to wells, intermittent streams, and lower aquifers. There is no direct hydrologic communication between this system and Lake Sakakawea, the Missouri River, the Knife River, or any buried valleys.

VEGETATION AND AGRICULTURAL PRODUCTION

The Truax tract is extensively used for agricultural purposes. Dryland farming methods, most notably alternate year summer fallow cropping rotations, are widely practiced in the area. Fifteen percent (3,652 acres) is fallowed each year (Table 4).

Small grains including spring wheat, oats, corn, barley, winter wheat, durum, flax, and sunflowers (in descending order of acreage grown) are grown on 38 percent (9,081 acres) of the tract. Wheat yields average 25 bushels per acre. Much of the cropland production, especially the wheat portion, is sold as a cash crop. Oats, barley, and corn are also used as feed grains in livestock operations.

Eight percent (1,805 acres) of the tract is used for growing hay for use in overwinter livestock feeding. Approximately 1.35 tons of hay are produced per acre.

Thirty-eight percent of the tract (8,938 acres) is rangeland and pastureland. Rangeland produces about .5 Animal Unit Months (AUMs) per acre. An AUM is the amount of forage needed to support a cow/calf for one month. Beef cattle are the predominant kind of livestock (North Dakota Crop and Livestock Reporting Service, 1980). There are also some dairy cattle, hogs, and sheep.

There are approximately 20 acres of shelterbelts, field windbreaks, and farmsteads per operation. There are several woody draws in the tract which are populated by native trees and shrubs.

TABLE 4
AGRICULTURAL LAND USE
ON THE TRUAX TRACT

Land Use:	Tract Acres	Average Production Per Acre 1/	Total Annual Production
Cropland	9,081	25.0 bu.	227,025 bu.
Hayland	1,805	1.35 tons	2,437 tons
Range	8,938	.5 AUM	4,469 AUMs
Other	337	1.35 tons	445 tons
Fallow	3,652	n/a	n/a
Total	23,813	n/a	n/a

1/ Crop : wheat equivalent bu./acre
Hayland: tons/acre of hay
Range : AUMs/acre
Other : tons/acre of hay

Except for reseeded rangeland, the rangeland is in the widespread mixed grass prairie type (Shaver, J.C. 1977). This includes species such as needle and thread, little bluestem, prairie sandreed, western wheatgrass, blue grama, side-oats grama, plainsmuhly, sedges, snowberry, fringed sagewort, and silver sage.

No threatened or endangered plant species, as published on the 1980 federal list, have been identified in the tract.

There are 56 operators and operator partnerships in the tract. Operations range in size from 34 acres to 1,680 acres inside the tract and from 96 acres to 3,405 acres in total.

Agriculture in the area includes crop operations, livestock operations, and mixtures of both. Most operations in the area include a balance between crops and livestock although there are a few that are predominantly of just one type (Table 5).

Thirty percent of the operations have less than 20 percent of their operations within the tract, while 27 percent have more than 80 percent of their acreage within the tract. Overall, the tract covers 37 percent of the acreage of the operations involved.

TABLE 5
FARM/RANCH OPERATIONS - TRUAX TRACT

	INSIDE COAL TRACT (ACRES)							OUTSIDE COAL TRACTS (ACRES)							
OPERATOR	SMALL GRAIN CROP	HAY	GRAZING	SUMMER FALLOW	OTHER	TOTAL	PERCENTAGE OF TOTAL ACRES LEASED	SMALL GRAIN	HAY	GRAZING	SUMMER FALLOW	OTHER	TOTAL	GRAND TOTAL	PERCENTAGE OF TOTAL ACRES IN TRACT
1	58	0	85	17	0	160	100	1051	90	1032	122	0	2552	2712	17
2	385	59	198	178	0	820	0	0	32	139	0	0	171	991	83
3	110	17	8	25	0	160	0	361	11	267	81	0	720	880	18
4	98	0	22	0	0	120	100	0	0	40	0	0	40	160	75
5	164	100	360	56	0	680	53	8	0	0	3	0	11	691	98
6	59	0	32	29	0	120	66	1242	0	877	881	0	3000	3120	4
7	31	0	0	27	0	58	100	110	0	188	94	0	392	450	13
8	287	0	21	132	0	440	64	1671	8	514	772	0	2965	3405	13
9	95	0	10	55	0	160	100	0	0	0	0	0	0	160	100
10	133	2	143	42	0	320	100	704	24	1048	304	0	2080	2400	13
11	205	0	106	49	0	360	100	433	56	340	82	0	911	1271	28
12	0	33	1	0	0	34	0	0	41	21	0	0	62	96	35
13	80	0	47	33	0	160	0	232	0	394	94	0	720	880	18
14	135	14	131	40	0	320	100	286	0	216	98	0	600	920	35
15	199	61	221	137	0	480	0	126	52	23	73	0	274	754	64

TABLE 5
FARM/RANCH OPERATIONS - TRUAX TRACT

	INSIDE COAL TRACT (ACRES)							OUTSIDE COAL TRACTS (ACRES)							
OPERATOR	SMALL GRAIN CROP	HAY	GRAZING	SUMMER FALLOW	OTHER	TOTAL	PERCENTAGE OF TOTAL ACRES LEASED	SMALL GRAIN	HAY	GRAZING	SUMMER FALLOW	OTHER	TOTAL	GRAND TOTAL	PERCENTAGE OF TOTAL ACRES IN TRACT
16	189	25	249	17	0	480	100	0	0	0	0	0	0	480	100
17	109	42	9	0	0	160	0	0	0	0	0	0	0	160	100
18	30	0	82	8	0	120	0	343	19	221	97	0	688	808	15
19	205	0	48	167	0	420	19	826	44	626	794	0	2290	2710	15
20	0	0	83	0	337	420	0	0	0	445	0	356	801	1221	34
21	369	139	679	13	0	1200	33	496	95	721	190	0	1502	2702	44
22	309	19	183	102	0	614	34	52	0	10	18	0	80	694	88
23	546	23	839	272	0	1680	95	15	0	18	7	0	40	1720	98
24	218	100	267	0	0	585	32	72	0	8	0	0	80	665	88
25	270	2	92	96	0	460	0	0	0	160	0	0	160	620	74
26	96	3	105	76	0	280	0	437	519	735	345	0	2036	2316	12
27	63	109	148	0	0	320	0	271	27	26	0	0	324	644	50
28	99	0	44	57	0	200	100	61	61	330	34	0	440	640	31
29	67	47	26	20	0	160	0	172	78	340	50	0	640	800	18
30	272	44	274	90	0	680	24	0	0	40	0	0	40	720	94
31	228	18	285	103	0	634	50	50	0	0	28	0	78	712	89

TABLE 5
FARM/RANCH OPERATIONS - TRUAX TRACT

	INSIDE COAL TRACT (ACRES)							OUTSIDE COAL TRACTS (ACRES)							
OPERATOR	SMALL GRAIN CROP	HAY	GRAZING	SUMMER FALLOW	OTHER	TOTAL	PERCENTAGE OF TOTAL ACRES LEASED	SMALL GRAIN	HAY	GRAZING	SUMMER FALLOW	OTHER	TOTAL	GRAND TOTAL	PERCENTAGE OF TOTAL ACRES IN TRACT
32	251	96	156	4	0	507	29	205	27	321	120	0	74	1191	43
33	55	0	69	15	0	160	100	104	9	73	25	0	211	371	43
34	321	166	427	86	0	100	52	179	58	344	19	0	600	1600	62
35	289	209	310	72	0	880	73	347	133	254	86	0	820	1700	52
36	204	72	84	0	0	360	78	57	6	551	0	0	614	974	37
37	9	0	70	1	0	80	100	129	0	10	21	0	160	240	33
38	16	35	23	6	0	80	100	72	53	107	8	0	240	320	25
39	153	101	388	0	0	640	44	0	0	40	0	0	40	680	94
40	186	9	42	123	0	360	100	77	0	160	77	1	315	675	53
41	200	4	73	83	0	360	11	0	0	80	0	0	80	440	82
42	203	38	108	159	0	508	29	0	32	0	0	0	160	668	76
43	55	0	5	55	5	120	0	11	0	17	12	0	40	160	75
44	164	32	195	121	0	512	100	18	31	98	0	0	160	672	84
45	100	0	15	45	0	160	100	1102	263	777	338	0	2480	2640	6
46	202	73	519	54	0	848	34	0	31	85	0	0	116	964	88

TABLE 5
FARM/RANCH OPERATIONS - TRUAX TRACT

	INSIDE COAL TRACT (ACRES)							OUTSIDE COAL TRACTS (ACRES)							
OPERATOR	SMALL GRAIN CROP	HAY	GRAZING	SUMMER FALLOW	OTHER	TOTAL	PERCENTAGE OF TOTAL ACRES LEASED	SMALL GRAIN	HAY	GRAZING	SUMMER FALLOW	OTHER	TOTAL	GRAND TOTAL	PERCENTAGE OF TOTAL ACRES IN TRACT
47	187	19	19	96	0	320	0	403	0	23	207	0	633	953	34
48	352	46	312	230	0	940	42	194	0	27	159	0	380	1320	71
49	181	0	143	176	0	500	100	606	185	1108	279	0	2178	2678	19
50	143	0	117	60	0	320	0	946	49	921	394	0	2310	2630	12
51	199	36	754	51	0	1040	69	109	22	52	14	0	197	1237	84
52	78	0	11	71	0	160	0	534	2	421	493	0	1450	1610	10
53	153	0	180	107	0	440	100	236	0	383	221	0	840	1280	34
54	33	0	15	32	0	80	0	140	0	209	131	0	480	560	14
55	157	0	34	149	0	340	0	826	44	626	794	0	2290	2630	8
56	70	14	61	15	0	160	100	62	0	84	14	0	160	320	50
TOTAL	9081	1805	8938	3652	337	23,813	49	15,377	2056	5550	7579	357	40,919	647,732	37

Forty-nine percent of the acreage within the tract is farmed by lessees, or operators who do not own the land. Fifty-one percent is farmed by owner/operators.

AGRICULTURAL ECONOMICS

This section will be forthcoming under separate cover.

LAND USE

This project area is presently used for agriculture. A portion has been mined for coal both by strip mining and underground mining and left in an unreclaimed state. The major portion of the subject land is either farmed or rangeland. Crops grown are small grains, hay, and silage. The principal cash products are wheat and cattle.

The principal town in the area is Hazen, population 2,365, which provides housing and other services for coal miners and construction workers. The Burlington Northern railroad also runs through Hazen and a spur from this railroad runs into the center of the tract. State Highway 200 is about two miles south of the subject lands and runs through Hazen. County roads, varying in the quality of construction from all-weather to seasonal, are located on the section lines. Power and telephone lines, usually located on or adjacent to a road right-of-way, service the farm and other residences within the tract.

The tract is zoned agricultural by Mercer County, but mining of the area is permitted with a conditional use permit. Lands adjacent to the tract are zoned and used for agricultural purposes, as this is considered their highest and best use.

The nearest active mines are Knife River located south of Beulah, North Dakota, eight miles to the southwest of the tract, and the North American mine, 14 miles to the southwest of the tract. Coal from these mines fuels the Coyote Power Plant and a power plant near Stanton, North Dakota.

RECREATION

Hunting of a variety of species (deer, upland game birds, waterfowl) is the main recreational opportunity offered to the public on the tract. This opportunity, while significant to local people, has limited attraction to people outside the immediate vicinity of the proposed mining.

The communities of Hazen and Beulah, North Dakota offer recreational opportunities in the general vicinity of the tract. Ball diamonds, parks, and a swimming pool, along with tennis and gymnasium facilities offer adequate opportunities at this time. Lake Sakakawea, north of the tract, offers state and federal recreational opportunities.

AESTHETICS

The character of the landscape, as noted in other sections of this document, is largely agricultural, but the dominant visual features in the area are spoil piles from existing mining.

Lands in agricultural use are divided into a north/south, east/west grid by roads and fencelines. The appearance of these fields varies with the type of crop through the year and from year to year. At any given time actively cropped fields, fields in fallow, and grazed prairie may stand side by side providing an attractive contrast in color and texture. The gently rolling topography upon which agricultural use is superimposed, gives legal dividing lines a curvalinear aspect when seen from normal viewing angles.

Coal mining activity within the tract boundary contrasts with the natural landscape in form and color. The lumpy nature of piles of spoil, typical of contemporary strip mining, is highly visible locally but is not visible from major transportation corridors or population centers because of intervening topographic features.

Manmade features are part of the character of this area and thus are not unexpected to either the local resident or the traveller. With the exception of areas where coal activity is evident, the locality is of high visual quality but is so common in the context of the region that its value as scenery is low.

WILDLIFE

This area has diverse topography and habitats, but is dominated by agriculturally disturbed land. The rolling terrain supports numerous grassed stream courses and only limited woodlands. The principle drainage is southerly into Spring Creek. Most stream courses are encompassed by native prairie, but a few have farmland abutting them. Wetlands are primarily riparian, a few manmade impoundments, and a number of good potholes. Wetlands compose 4.6 percent of the area; woodlands, 1 percent; native prairie, 25 percent; agriculturally disturbed, 66 percent; and mined area, 3 percent. Total mapped area is 24,186 acres.

Farming has left remnant wetlands, woodlands, and substantial native prairie around the stream courses because the terrain is generally too broken for farming.

Woodlands, wetlands, and native prairie provide essential habitat for 29 sensitive species throughout the biological year. The Whooping crane, an endangered species, flies over this area annually during migration (Table 6).

TABLE 6
WILDLIFE HABITAT AND SPECIES

Woodlands	Wetlands	Native Prairie	Agriculturally Disturbed
*Sharptail Grouse	*Hungarian Partridge	*Sharptail	Sharptail
*Hungarian Partridge	Mourning Dove	Hungarian Partridge	Hungarian Partridge
*Mourning Dove	*Pheasant	Mourning Dove	Mourning Dove
*Pheasant	*Mallard	*Whooping Crane	Pheasant
*Merlin	*Gadwall	*Merlin	Whooping Crane
*Swainson's Hawk	*Whooping Crane	Swainson's Hawk	Swainson's Hawk
Marsh Hawk	*Pintail	Marsh Hawk	Marsh Hawk
Ferruginous Hawk	*Greenwing teal	*Burrowing Owl	Ferruginous Hawk
*Loggerhead Shrike	*Widgeon	*Ferruginous Hawk	Whitetailed Deer
*Whitetailed Deer	*Shoveler	Loggerhead Shrike	Red Fox
*Mule Deer	*Redhead	Whitetailed Deer	Badger
Mink	*Canvasback	*Mule Deer	No. Swift Fox
Beaver	*Ruddy	*Antelope	
Red Fox	*Sandhill Crane	Mink	
Badger	*Swainson's Hawk	Red Fox	
No. Swift Fox	*Marsh Hawk	*Badger	
*Bobcat	*Sprague's Pipit	*No. Swift Fox	
	*Whitetailed Deer	Bobcat	
	*Muskrat		
	*Mink		
	*Beaver		
	*Red Fox		
	Badger		

*Essential habitat for species

It is the interspersion of essential habitats that provide the greatest amount of edge, have the highest wildlife diversity, and largest populations. The remnant wildlife habitats, either singly or interspersed, are the result of 60 to 70 years of intensive farming of all suitable land, with limited exception. These residual wildlife habitats are the best habitat remaining in the area.

Wetlands, specifically prairie potholes, are the most productive wildlife habitat in North Dakota.

All remaining native grasslands represent precious relics of the original prairie ecosystem. They evolved during thousands of years and, once destroyed, cannot be exactly duplicated by man. The rate of native prairie loss in North Dakota has been tremendous, and unplowed prairie is only 20 percent of the original total.

There are no sensitive fish, amphibians, or reptiles identified in this area at this time. There are sensitive fish in the Missouri River and Spring Creek downstream from the area.

CULTURAL RESOURCES

There are strong indications that both historic and prehistoric resources from the tract would be recorded when it is inventoried. To date, no systematic survey has been conducted. Therefore, specific comments cannot be made.

Cultural resources information has been collected from areas within ten miles of the tract. The results these similarly conducted inventories have produced are widely different. West of the tract densities of cultural resources as high as seven per section have been found, while north of the tract no resources have been recorded. Tipi rings, lithic scatters and cairns are the most frequently recorded cultural resources.

Why the homogeneous topography in the vicinity of the tract has produced such widely different inventory results is not possible to determine. Some specific, not yet recognized factor, made one area preferable to another. Whether the tract contains this same factor is not known.

The dominant human use of the area in the historic period has been farming. Stock raising has been a minor use. Most evidence of historic activity is oriented toward farming activity. This activity, which continues to the present time, has possibly eradicated cultural resources from earlier times.

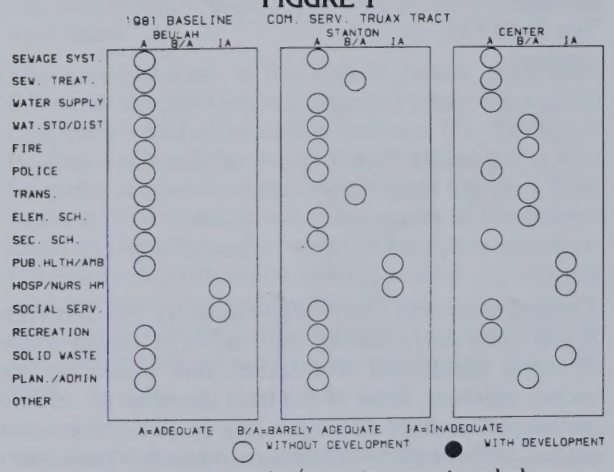
ECONOMIC AND SOCIAL CONDITIONS

Existing and forecasted population and employment levels for the communities of Beulah, Stanton, and

Center, North Dakota are shown in Figure 3, Chapter 3 (Mountain West 1981). As this figure shows, future population levels without the leasing of federal coal (refer to dashed line) are expected to increase and decrease substantially for all three communities. These increases and decreases are due to the construction of energy projects not directly related to federal coal leasing.

Beulah, Stanton, and Center have previously experienced significant population and employment increases due to coal development. These communities have made strong efforts to maintain adequate public services in spite of population increases. However, as Figure 1 shows, all three communities presently (1981) have two or more services that are considered to be inadequate. For example, Beulah currently has inadequate social services for its present population.

FIGURE 1



SOURCE: Respective city/county or regional planners.

The adequacy ratings appearing in Figure 1 reflect assessments by county planners, regional planners, and town councils. It should be recognized that some assessments were based on best judgments and are somewhat subjective.

Law enforcement, recreational facilities, medical care, and retail opportunities emerged as the major existing service deficits identified by residents in Mercer County. Seventeen residents were contacted by a BLM Survey and these four service areas were listed as major existing concerns. In Oliver County six persons, who expressed concern only about medical care shortages, were contacted.

Support for additional mining in the area appears to be quite strong in Mercer County, where roughly three-fourths of the persons contacted expressed support for mining. The reasons given were the need for local economic growth and employment opportunities. Efficient use of the resource, reclamation, and relations between coal companies and land owners were the concerns brought up by the residents in Mercer County. Mercer County officials were equally supportive of expanded mining development with no official expressing opposition to mining locally. However, the concerns of these officials indicate that there are issues that deserve attention. Reclamation, availability of sufficient revenues, air pollution, pressure on local schools, and the local way of life, were mentioned as issues attached to local mining.

In Oliver County the very small number of residents contacted, six, means that the results of the survey must be interpreted with great caution. However, it appears that Oliver County residents are also typically supportive of development, as only a single person expressed concern on the future availability of surface water, the viability of reclamation efforts, and the local social effect of population increases.

Officials in Oliver County were unanimously supportive of development. National energy needs, the likelihood of successful reclamation, the availability of the resource, and similar considerations were cited as reasons for their support. These officials recognized, however, that reclamation issues, taxes, revenues, rights of surface owners, and adequate compensation to land owners were issues deserving the attention of various local, state, and national representatives.

The dominant favorable characteristic mentioned in the interviews by residents of both Mercer and Oliver counties was the existing social atmosphere. Aesthetics and outdoor recreation also received support as positive aspects of life in the area. This prevailing sentiment appears to be that the small town, uncrowded, informal, mutually supportive social environment is the most favored characteristic of living in these communities.

On the negative side, in Oliver County there was dissatisfaction with the lack of outdoor recreation opportunities and the climate along with the failure of some residents to be fully integrated into the existing social structures. In Mercer County, residents expressed dissatisfaction about retail opportunities, medical care, and entertainment facilities, as well as the climate and the presence of persons dissimilar to long term residents.

CLIMATE AND AIR QUALITY

The climate of western North Dakota is typically continental, characterized by variable temperature and precipitation. The predominant pressure systems, out of the Gulf of Mexico and the Arctic, account for the rapid alterations of meteorological conditions common to the area. Cold polar air masses dominate the winter months, while moist Gulf air masses prevail in the spring and summer, distributing the major precipitation across the area.

Meteorological data available from surrounding stations are shown in Tables 7 and 8. The Truax tract is located northwest of the meteorological station at Beulah and within the National Weather Service (NWS) West Central Region. The meteorological station at Beulah will be used to establish benchmark climatology for the tract.

TABLE 8
REPRESENTATIVE REGIONAL METEOROLOGICAL DATA

	Regional Values
Humidity (Annual Average), %	40-50
Lake Evaporation (Annual Avg.), in.	50-55
Extreme Weather	
Thunderstorms, days/year	30
Tornadoes, sightings/year	rare
Hail, days/year	2-4
Maximum recorded wind speed, mph*	72
Inversion Frequency (base 1500 ft.), %	
Annual	35
Seasonal Range	30-50
Mixing Height, ft.	
Mean Annual Morning	984-1312
Mean Annual Afternoon	4921-5249
Mean Seasonal Afternoon Range	1968-7874

*Recorded at Bismarck, North Dakota

Sources:
Brum, L.J., J.W. Enz and J.M. Ramirez 1978.
Jensen, R.E. 1974.
Ramirez, J.M. and T. Method 1976.
U.S. Department of Commerce 1974.

The annual mean temperature for the area is 41°F with a highest monthly mean temperature of 69°F (in July), and a lowest monthly mean temperature of 8°F (in January). The average growing season is approximately 121 days; the last spring freeze generally occurs during the third week of May, while the first fall freeze generally occurs during the third week of September (Ramirez, and Method 1976).

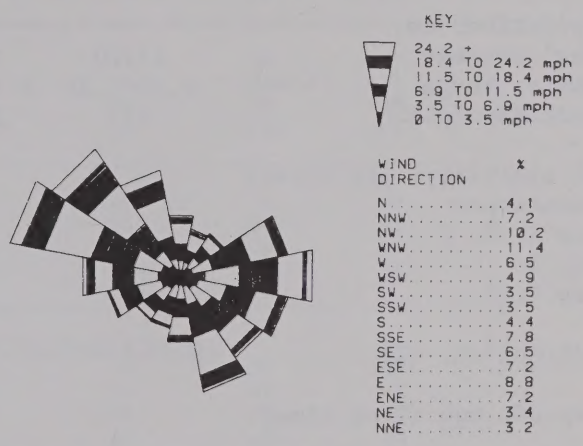
Precipitation in the area occurs predominately in the late spring and early summer (May to July). Annual precipitation averages 17.20 inches at Beulah, and 16.91 inches through the NWS West Central Region. The average annual snowfall at the Beulah station is 27 inches.

Wind data used for this analysis were obtained from the Bismarck climatological station, the nearest station to the tract with data suitable for input into the dispersion model. The wind rose in Figure 2 represents a summary of this data. Winds prevail from the WNW to NNW at Bismarck (29 percent frequency of occurrence). Wind speeds average 10.2 mph and exceed 11.5 mph 36 percent of the time.

Although the terrain offers only limited obstruction to the dispersion of pollutants, the area experiences frequent temperature inversions, which reduce mixing heights and tend to concentrate pollutants (Brum, Enz and Ramirez 1978).

Table 9 presents some of the available air monitoring data from ambient air monitoring stations in the general vicinity. Recorded annual geometric mean concen-

FIGURE 2



WIND ROSE FOR BISMARCK NORTH DAKOTA

Garrison) to 32 ug/m³ (at Beulah, rural). From 1974 to 1980 the annual geometric mean concentration of TSP at the Beulah residential monitoring station ranged from 28 to 61 ug/m³. For the purpose of the following computer analyses, the background rural TSP levels will be set at 24 ug/m³ for the annual level and 100 ug/m³ for the 24-hour level.

Three Class I areas, the North and South Units of Theodore Roosevelt National Park and the Lostwoods National Wilderness Area, fall within the potential impact range of the proposed tract and associated developments. Based on 1979 air quality computer modeling estimates by the North Dakota State Department of Health, the allotted 24-hour SO_2 increment for the South Unit of the Park is consumed, or nearly consumed.

TABLE 7*
METEOROLOGICAL DATA FOR SELECTED SITES

Parameter	Beulah	Center	Washburn	Dunn Center	Bismarck (WSO)	NWS West Central Region
Temperature, °F						
$\bar{X}$ annual, °F	40.6	40.5	41.9	40.2	41.4	40.6
$\bar{X}$ monthly low (Jan)	7.6	8.5	8.2	7.9	8.2	8.4
$\bar{X}$ monthly high (July)	69.3	69.0	70.8	68.7	70.8	69.4
Average growing season (temp. 32° F), days	121	117	133	122	133	120
Precipitation, in.						
Annual average	17.20	17.45	18.01	16.57	15.15	16.91
Monthly range	0.32-3.35	0.48-3.55	0.35-4.11	0.36-3.72		0.40-3.92
Annual snowfall	27	29.8	30	34	40	30
Annual stability, (by class) % occurrence						
Class A, B, C					14.3	
Class D					56.4	
Class E, F					29.3	
Wind direction, (%)					W-NW(28)	
Wind speed, mph (% of time)					0-3.5 (4) 3.6-6.9 (13.4) 7-11.5 (30.5) 11.6-18.4 (39.1) 18.5-24 (11.3) >24 (1.6)	
Average wind speed, mph					10.8	

*SOURCES:
Jensen, R. E. 1972.
North Dakota Crop & Livestock Reporting Service 1980.
Ramirez, J. M. and T. Method 1976.
Ramirez, J. M. 1972.
Ramirez, J. M. 1973.
U.S. Department of Agriculture 1978.
U.S. Department of Commerce 1948-1974; 1973; 1974; 1979.

TABLE 9
WEST CENTRAL NORTH DAKOTA AIR MONITORING DATA*

Monitoring Site	Year	Parameter	No. Observations	Max. Observation (ug/m^3)	2nd Max. Observation (ug/m^3)	Annual Geom. Mean (ug/m^3)	Annual Arith. Mean (ug/m^3)
			State-Operated Sites:				
Beulah (rural)	74	TSP	10	488	47	26	69
	75	TSP	39	171	141	24	37
	76	TSP	51	81	61	24	29
	77	TSP	58	224	73	24	31
	78	TSP	52	288	258	32	52
	79	TSP	28	82	78	22	28
Beulah (residential)	74	TSP	32	1781	161	28	91
	75	TSP	48	151	126	34	41
	76	TSP	61	148	136	49	59
	77	TSP	58	290	149	45	55
	78	TSP	19	284	124	51	68
	79	TSP	45	214	197	51	67
	80	TSP	55	630	204	61	78
		SO_2	5517	104	73	<5	<5
Dunn Center (rural)	79	TSP	4	37	17	16	19
		SO_2	1896	78	26	13	13
	80	TSP	33	58	52	22	25
		SO_2	7332	52	39	<5	<5
Stanton (rural)	76	TSP	61	150	104	31	39
	77	TSP	60	237	90	24	32
	78	TSP	58	104	67	19	24
	79	TSP	42	90	80	19	25
			Privately-Operated Impact Source Monitoring Sites:				
Ramp #1 Beulah	79	TSP	11	161	93	57	69
		SO_2	1403	78	65	<5	<5
	80	TSP	59	642	125	24	41
		SO_2	6250	81	63	<5	<5
Ramp #2 Beulah	79	TSP	11	76	74	42	47
		SO_2	1401	73	52	<5	<5
	80	TSP	57	613	156	25	45
		SO_2	6251	91	84	<5	<5
Ramp #3 Beulah	79	TSP	11	1000	114	85	158
		SO_2	1403	47	39	<5	<5
	80	TSP	58	141	96	26	34
		SO_2	6239	148	107	<5	<5
Ramp #4	79	TSP	11	121	120	70	81
		SO_2	1403	102	63	<5	<5
	80	TSP	41	523	161	24	45
		SO_2	4141	165	151	<5	<5
Ramp #5	79	TSP	11	129	89	45	56
		SO_2	1404	37	31	<5	<5
	80	TSP	59	707	126	21	41
		SO_2	6164	60	57	<5	<5
Coteau #1	80	TSP	45	572	134	26	46
Coteau #2	80	TSP	41	700	308	49	80
Coteau #3	80	TSP	29	815	206	41	80

*SOURCE - NORTH DAKOTA STATE DEPARTMENT OF HEALTH

CHAPTER III
ENVIRONMENTAL CONSEQUENCES

TOPOGRAPHY

The natural contour of the land would be modified during surface mining. Although most would be returned to its approximate original contour, difference in detail would remain, including drainage patterns and final sloped highwalls.

In general, the reshaped ground would not be steep enough to cause slope failures and related hazards. Until natural vegetation can be reestablished, accelerated erosion resulting in unsightly scars on the land would be a potential problem.

GEOLOGY AND MINERALS

The major impact of the leasing alternative would be the removal of 282.9 million tons of coal. Mineral resource conflicts might occur between development of oil and gas and mining of coal since there is a slight chance of oil and gas production on the tract.

SOILS AND RECLAMATION POTENTIAL

The types of impacts affecting the soil resources in this area have previously been discussed in Bureau of Land Management planning documents and the Draft West-Central North Dakota Regional Environmental Impact Study. Briefly, the basic impacts are the disruption of the present soil bodies with temporary loss of productivity, in addition to problems associated with erosion, compaction, and instability.

Soil erosion and compaction problems would not be new to the area because of the dryland agricultural activity that presently exists. About 38 percent of the tract is annually cropped with 15 percent left bare of protective cover due to summer-fallowing. Therefore, these types of impacts would continue with or without the presence of an active mine.

Some instability problems would probably appear with the onset of reclamation. Area-wide settling, localized subsidence or collapse, and underground erosion called piping may occur (Groenwald, 1980). If the required stipulations covering the handling of soils and overburden during surface mining operations are closely adhered to and enforced, however, instability impacts should be minimal.

The soils would be lost to the production of grass, forage, and grain over the short term use (about 10 years for each annual disturbance of 476 acres) of the tract for coal mining. This loss would occur only on the active portion of the mine at any given time. Once in full operation, the total area out of production in any peak mining year is estimated at 4,800 acres. Soils would be continuously replaced on mined-out areas and brought back into production during the life of the mine (50 years).

Preliminary indications, from completed and ongoing research by such agencies as the Science and Education Administration—Agricultural Research of Mandan, North Dakota and North Dakota State University—Agricultural Experiment Station of Fargo, are that agricultural productivity of mined land can be restored. Much depends, however, on the planning and implementation of a concerted reclamation effort (Power 1974).

With a good reclamation effort, successful return of agricultural productivity over the tract should be possible. Soils Table 2 in Chapter Two indicates that most landowners have sufficient acreage of soil rated "good" and "fair" for supplying cover soil material in surface mine reclamation. However, there are two separate parcels that have nearly half or more of their acreage rated "poor." These may require a very intensive reclamation effort to ensure successful rehabilitation. Often a thin layer of topsoil can be salvaged from the "poor" soils. If better soils exist in the parcel of land, they can provide extra material to average over the area. Several core drill holes in the Renner and North Beulah tracts about 8 miles west of Truax indicate that the top portion of some of the overburden may be suitable for use near the surface of reconstructed soil profiles. If enough suitable plant growth material from the above mentioned sources can be averaged over parcels with soils rated "poor," it should be possible to increase their productivity.

HYDROLOGY

During mining, all of the surface runoff from the disturbed area must be impounded and retained until it meets specified quality standards. An exception would occur if storm runoff exceeded the design capacity of the reservoir. Water that collects in open mine pits is also often pumped into these surface water reservoirs. While these runoff catchment basins are in place, total

water yields would be decreased due to increased evaporation and infiltration at the reservoirs. Table 10 shows the maximum possible loss of yield for the watersheds draining this tract, assuming no surface water is released. The impact on local streams could be significant.

Water which is released from the impoundments would generally have less suspended solids, higher dissolved solids, and higher sodium absorption ratios. At this time it is impossible to predict the concentration of these water quality constituents.

The Beulah-Zap lignite and possibly other lignite or sand beds in the mine disturbance zone probably supply a small amount of water to wells in this tract. As the lignite is mined any such aquifers would be destroyed. While the mine pits are open, water levels in the lignite aquifers would be drawn down in the area surrounding an open pit. The distance this drawdown would occur from an open pit is variable and dependent upon the local aquifer characteristics.

The physical disturbance caused by mining would also result in changes in the chemical quality of the local groundwater. Increases in sodium, sulfates, and total dissolved solids concentrations have been reported by Groenwald (1979 and 1980) at other mines in North Dakota with similar overburden. The changes in water quality were variable but dependent upon overburden characteristics and reclamation practices. The quality of water in the replaced overburden would be similarly degraded.

Because of the lack of information it is very difficult to assess this impact in terms of number of wells affected. There are about eight wells known to be finished in the disturbance zone. There are 28 more farmsteads for which the water source has not been inventoried. Based on the percentage of inventoried wells that are finished at shallow depths, probably about 10 farmsteads representing 15 wells would be shallow wells. Water supplies are available from deeper aquifers.

VEGETATION AND AGRICULTURAL PRODUCTION

The proposed action would progressively remove an average of 476 acres per year of the total tract from its current uses per year. The major use of these lands is agricultural production. The first land taken out of agricultural operations, except for the plant site and ancillary facilities, would occur in the first year of mining. The time period of removal from agricultural production would be the time spent in mining and land reclamation. The entire tract would be progressively mined over a 50 year period.

Mining would be the land use of any one location for one to five years depending on the type of mining. Land reconstruction to premining levels of agricultural production would require a total of approximately ten years. The land would be placed into the premining type of agricultural production or other premining uses that the landowner and Public Service Commission agree upon (wildlife habitat, woodlands, or rights-of-way). Vegetation reestablishment would occur during the first appropriate season after grading to topography and replacing of topsoil.

The company would be under bond for at least ten years, or as long as necessary to prove, at a 90 percent confidence level, that agricultural productive capacity had been restored (Public Service Commission, Reclamation Department 1980). Reclamation research, by such agencies as the Science Education Administration—Agricultural Research Service and the North Dakota State University—Agricultural Experiment Station indicates that some degree of optimism for the restoration of land to agricultural production is justified. There is no certainty as to how long it would be before all mined land would be judged to be as fully restored as the law requires.

The leasing and development alternative would have a significant short-term impact on individual agricultural

TABLE 10
MAXIMUM LOSS OF WATER YIELD FROM THE TRUAX TRACT

Watershed	Area to be Disturbed (acres)	% of Watershed to be Disturbed	Maximum Water Yield Reduction (acre-feet/yr)	% Reduction in Flow
Raymond Creek	2,304	10	39	7.2
Coal Creek	7,936	62	501	47
Antelope Creek	19,302	26	1484	24
Knife River Direct Tribs.	582	13	49	13

operations in the tract. By the end of the 50-year mine life, 23,813 acres of the tract would be disturbed, in addition to 160 surface acres used for existing mine facilities.

An average of 190 acres of cropland, excluding summer fallow, would be removed from production each year. This would be an average annual loss of 4,750 bushels of wheat. This 190 acres of cropland would be out of production ten years with a maximum of 1,884 acres out of production in any one peak mining year, resulting in a maximum loss of 47,100 bushels of wheat annually.

Peak mining years disturbance of 361 acres of non-cropped hayland would result in an annual loss of 487 tons of hay production.

An average of 181 acres of rangeland would also be removed from production each year, resulting in an average loss of 90 AUMs. This 181 acres of rangeland would be out of production ten years, with a maximum of 1,788 acres out of production in any one peak mining year, resulting in a maximum annual loss of 894 AUMs.

Regionally, these losses would not pose significant reductions in area agricultural production.

Time constraints necessitated BLM doing agricultural data collection on the preliminary logical mining unit instead of the later final logical mining unit. The data may not completely represent the logical mining unit in its final form.

In reestablishing native-type range, it is likely that some introduced species will be used. The laws require that introduced species be of the same seasonal variety and of equal or superior utility to the native species. Some of the more sensitive plants (for cropland, woodland, or rangeland use) may have difficulty in becoming established on some of the less suitable soils.

Forbs, woody plants, and trees (woodlands) must be reestablished along with grasses.

AGRICULTURAL ECONOMICS

This section will be forthcoming under separate cover.

LAND USE

Effects on land use represent the extension of an existing use through time. Impact to land use is, therefore, limited to changes within the tract boundaries. Mining would displace existing use either temporarily or permanently. Facilities such as power lines and roads would either be bypassed or relocated. If relocated, temporary inconvenience to local traffic and utility users may result.

If existing state laws and federal regulations are adhered to, the existing agricultural use pattern would return after reclamation and the impact could be considered reversible and temporary, limited to the period of active mining and reclamation. Progressive mining and reclamation may abbreviate this period of displacement.

RECREATION

Habitat destruction and the resulting loss of wildlife species (deer, upland game birds, waterfowl) would damage recreational hunting. From the recreation perspective, it is likely the loss would be manageable.

Social and economic studies have documented demographic changes resulting from mining that would stress communities in the vicinity of the tract. This stress would be felt on the available recreation facilities in the communities. Outside of the communities, increased pressure would be seen on private and public land because of recreational opportunities lost to mine related impacts.

AESTHETICS

The effect of leasing is the perpetuation of an existing use and is likely to be accepted as a part of the character of the region. Expansion of the mine would alter some areas that would be visible from Hazen and State Highway 200. If reclaimed according to state law and federal regulation, however, the mining activity would not be as visible as existing activity. The principal impact would be reduction of visual amenity in views from the town of Hazen.

WILDLIFE

Coal mining and attendant actions would severely disrupt and destroy significant native woodlands and riparian wetlands interspersed with native prairie, which singly and in composite constitute the essential habitats for 31 sensitive wildlife species and many other more common wildlife.

On-site effects to wildlife resources would be degradation and loss of the three essential habitats. Off-site aquatic habitats in the Missouri River and its tributaties and Garrison reservoir would be the recipient of potential point and non-point pollution.

The agriculturally disturbed areas are of low wildlife habitat value, but do provide spring and fall feeding and loafing habitat for migratory waterfowl and shorebirds.

The areas identified on Map 3, Chapter I, are those which represent the highest sensitive wildlife habitats.

There would be a significant area loss to wildlife resources if strip mining occurs in the essential wetlands, woodlands, and native prairie.

Mobile wildlife such as birds and large mammals may shift about the habitat losses to some degree, but nonmobile species such as reptiles and amphibians would be destroyed. The very limited availability and disruption of riparian woodlands and wetlands would restrict, and in many cases exclude, the accommodation of disturbed mobile wildlife.

Noise, presence of humans, heavy equipment, dust, and affiliated disturbances cumulatively may cause wildlife to vacate unmined habitats and may preclude adoption by wildlife of those rehabilitated areas until the disturbances are eliminated. This may be for the life of the mine and rehabilitation period, which may be as long as 20 or more years.

Increased human populations resulting from mine development and operations generally reduce wildlife populations and habitat locally and off-site. Other impacts to wildlife include increased poaching, road kills, increased legal harvest, disturbance of reproductive and migratory periods and habitats, harassment by recreationists. Additionally, degradation and complete loss of habitat would occur due to housing, shopping, waste treatment, services, and similar urban development. The problem is compounded in areas where shift changes of workers coincide with feeding periods, especially big game. The same would probably occur in this area.

Actions to mitigate these impacts, available to entities other than BLM, would be to provide mass transportation of workers and adjust the times of shift changes, which would greatly reduce poaching. This has been used successfully in other mining areas. Providing funds for the North Dakota Game and Fish Department for increased law enforcement and adoption of a poaching clause in union contracts would also help.

Successful reclamation of native woodlands and natural wetlands such as "potholes" and riverine wetlands has not been demonstrated. Native prairie has not been successfully reclaimed either, although some prairie plowed about 70 years ago and since left undisturbed. shows some evidence of native plant reestablishment.

Concurrent reclamation of lost wildlife habitat within 12 to 18 months after mining may reduce a few of the less negative wildlife impacts. However, disruption or loss of any of the larger wetlands and riparian woodlands is expected to become a permanent loss.

At present there is no information to suggest that natural, biologically viable wetlands (e.g., potholes) can be reclaimed from mine spoil in this country. It would be most productive and conservative to eliminate mining from the larger wetlands (e.g., 1/2-acre and greater) thereby retaining the critical soils structure of the wetlands and eliminating the extended delay proposed for wetlands reclamation attempts. Destruction of natural viable wetlands by strip mining under the present state of biological and hydrological knowledge would be an irretrievable commitment of wildlife resources.

An interagency team of Wildlife biologists from the North Dakota Game and Fish Department, U.S. Fish and Wildife Service, and Bureau of Land Management have identified and recommended areas for the application of unsuitability criteria (Map 3). Formal recommendations have been received by BLM from the two agencies. Joint agreement among the agencies and final decisions on unsuitability, exemptions such as producing leases and exceptions will be completed in August 1981.

CULTURAL RESOURCES

All cultural resources within the tract boundaries are subject to direct and indirect impacts. Direct impacts are those that result from ground disturbance activities and can result in damage and destruction to sites, artifacts, their environmental context, and the data they contain.

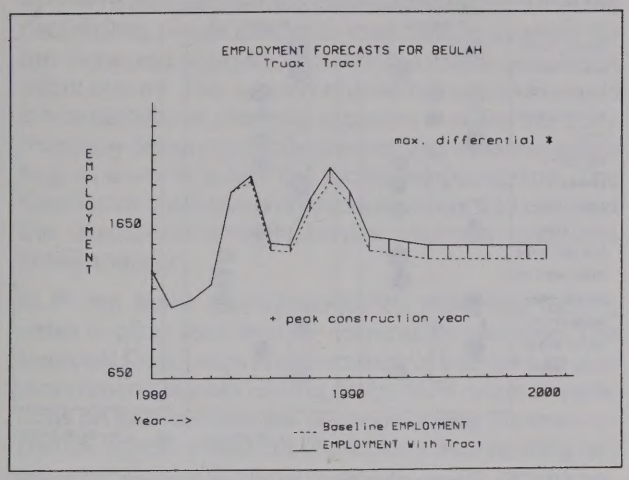
Sites not directly impacted by earth disturbance may be impacted as a result of the earth disturbance. These secondary impacts can include vandalism increased by improved access, loss as a result of erosion or degradation resulting from disruption of natural setting.

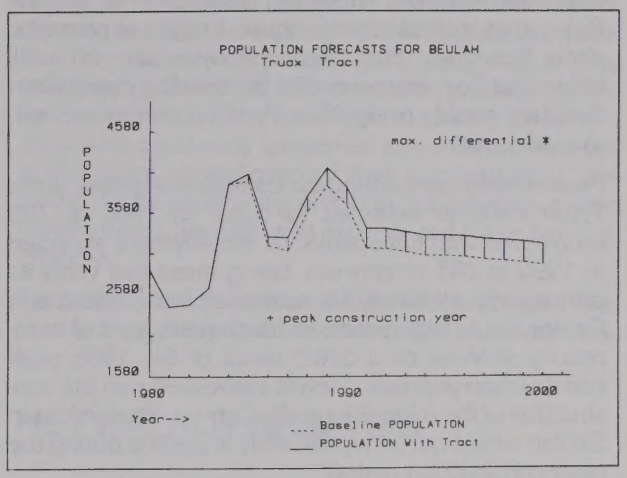
In the event of lease, stipulations covering cultural resources would have to be developed. These stipulations would have to treat both recorded and unrecorded sites. They would also have to require management plans for cultural resources that detail mitigation plans for each site to be impacted. As in any cultural resources mitigation, preservation alternatives are preferred. If these options are not viable, then scientific data recovery programs would have to be developed.

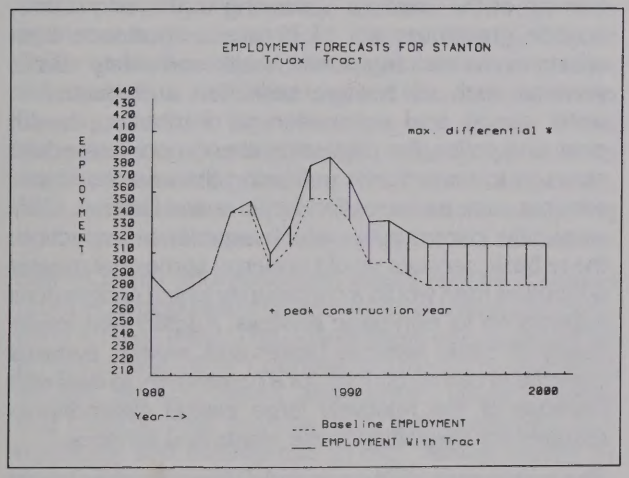
ECONOMIC AND SOCIAL CONDITIONS

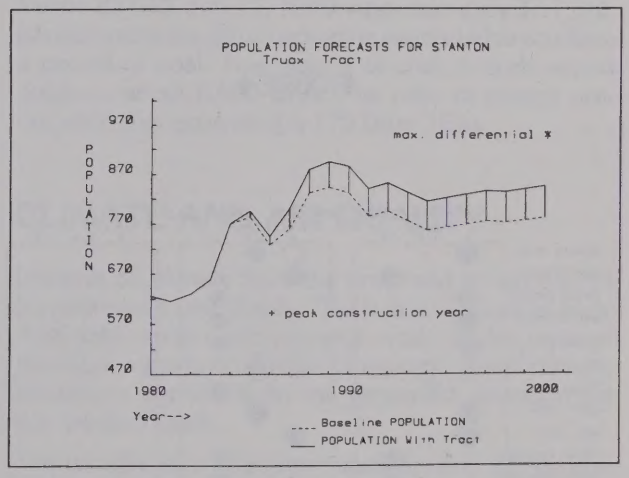
Construction and operation of the Truax mine would result in significant impacts upon services in some communities within the area because of population growth associated with employment opportunities. Figure 3 shows forecasted community employment and population levels through 2000 with and without development of the Truax tract. As this figure shows, Beulah, Stanton, and Center would experience a significant increase in both population and employment as a result of the development of the tract.

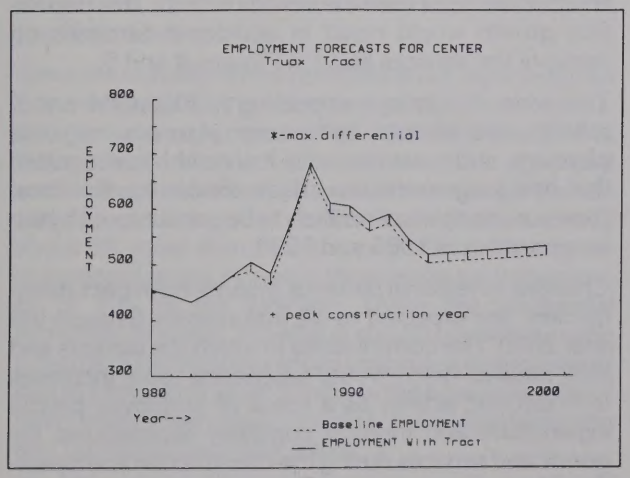
FIGURE 3

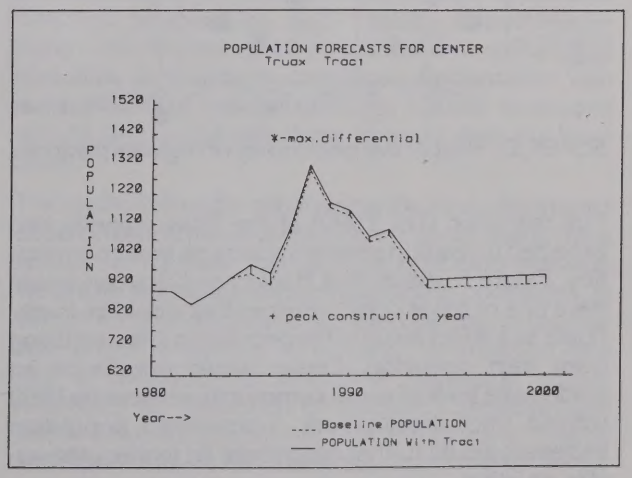










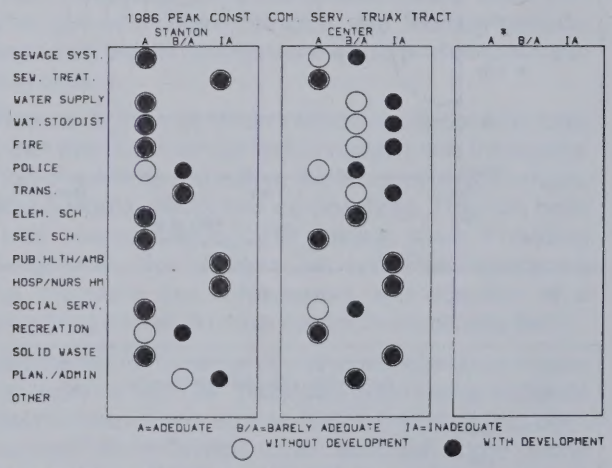


SOURCE: Mountain West Research, Inc., 1981.

Several other communities in western North Dakota would also receive population increases as a result of tract development. However, assessments by the Bureau, as well as city-county and regional planners, show that these population increases are so small (often less than one percent of the baseline population) that they would not significantly affect community service adequacy.

Peak employment during the construction phase of the Truax mine is expected to occur in 1986 at 195 employees with full operations employment expected in 1990 at 265 employees. Using these two years as primary impact dates, it is estimated that Stanton and Center would experience an inadequate level of community services as a direct result of the 1986 peak construction-population levels associated with the construction of the mine (Figure 4). Community services in Beulah would not be significantly impacted during the peak construction period.

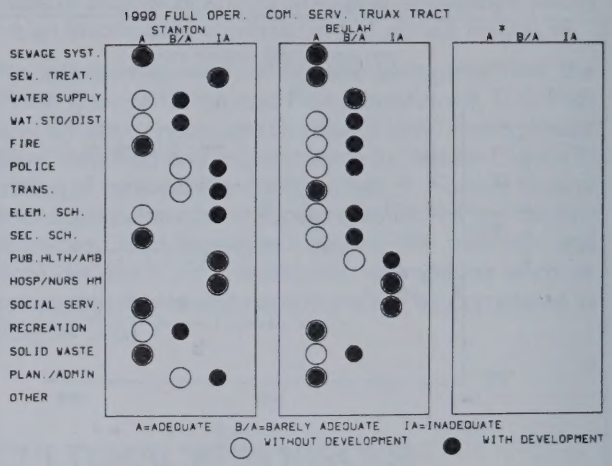
FIGURE 4



SOURCE: Respective city/county or regional planners.

Full operation (i.e., 1990) of the Truax mine is also expected to result in serious impacts on area communities. Figure 5 shows that Beulah and Stanton would have one or more public services that would be inadequate as a direct result of the population influx resulting from tract operation. Center would experience an inadequate level of some community services by 1990 without tract development. Tract-related population increases would further exacerbate an inadequate service situation.

FIGURE 5



SOURCE: Respective city/county or regional planners.

Several of the services appearing in the community service groupings are of greater importance than others in maintaining public health and safety. Basic services such as sewage collection and treatment, water supply and water storage/distribution, health care, and police/fire protection are of more immediate concern to community well-being than are non-basic services such as recreation facilities and libraries. Consequently, communities which experience impacts to these basic services would undergo somewhat greater difficulties than would a community which experiences impacts on its non-basic services. Additionally, inadequacy of basic services (water and sewage systems especially) can be difficult for a community to deal with because of the relatively large capital expenditures required for upgrading these plants and services.

The rural areas of Mercer and Oliver counties would also receive tract-related population influx (though at a much lower level than the communities). This population growth would result in additional demands on some of the services listed in Figures 4 and 5.

The adequacy ratings appearing in Figures 4 and 5 reflect assessments by county planners, regional planners, and town councils. It should be recognized that best judgments were made concerning the fiscal (revenue/cost) situation likely to be encountered by the communities in 1986 and 1990.

Changes in regional personal income from tract development are expected to be insignificant through the year 2000. The communities in which the workers and their families reside would experience some increases in economic activity as a result of employee payroll expenditure and through company expenditures for goods and services during the construction and operation phases.

There appear to be three factors that are critical in mitigating many of the adverse economic impacts due to coal related population growth. One factor is that the community needs adequate lead time to prepare for the increased population before the major population influx occurs. The second crucial mitigation factor is the availability of planning expertise to assist the community in designing and implementing a planning strategy to accommodate the increased population. The third factor is adequate financial assistance to carry out the needed community service improvements in a timely manner.

BLM can make recommendations regarding leasing dates to allow lead time for community planning. The Regional Coal Team and Secretary of Interior can also recommend certain leasing dates. BLM recommendations on leasing dates will be made during the environmental impact statement phase, after tract ranking has occurred.

The affected counties and communities may be able to obtain planning and financial assistance through state agencies such as the North Dakota Energy Impact Office and federal agencies such as the Farmers Home Administration and Department of Housing and Urban Development. At this time, it is not known if the impacted communities would actually be able to acquire the needed planning and financial assistance. This is dependent upon Congressional budgeting action and total demand for energy impact assistance.

Stark County and Dickinson would receive a limited number of population effects due to opening and operating a Truax mine. The bulk of these effects would fall in Mercer and Oliver Counties and the communities of Beulah, Stanton, Hazen, and Center. These counties and communities are now fairly well diversified economically and socially due to coal mining nearby. In addition, public officials in both areas should now be familar with growth management problems. This would be a definite asset in dealing with the results of population increases.

Since the number of new residents is not expected to be extremely high during either the construction or operation phase in any communities other than Beulah and Hazen, these towns would receive the most significant social structural effects. Population levels for Beulah and Hazen during the construction phase are only about 3% more than baseline projections. During the operational phase, however, these levels are in the vicinity of 10% of the baseline. These are substantial increases. However, the effects should not be traumatic in terms of the ongoing social processes of these areas due to past and present mining in the area. Instability of noteworthy scale would not likely result from opening and operating the Truax mine.

The Truax mine would result in some population increases in Mercer and Oliver counties. These populations are not exceptionally large, however, and it would not be expected that residents' perceptions of favorable area attributes would be seriously jeopardized. The changes that would occur in these communities (Mercer and Oliver counties) would be added to those that have already happened. The Truax mine and its attendant population effects might produce some further reduction in area satisfaction among those residents who are already concerned about recent changes in the social environment of their communities. This would not be particularly pronounced, however, as the communities have already experienced these types of changes.

Technical reports are available which discuss the methodology used in the economic and social analysis.

NET ENERGY ANALYSIS

A net energy analysis was calculated using the guidance contained in BLM Washington Office Information Memo 80-640, July 17, 1980. Approximately 37.7 British thermal units (Btus) would be expended to produce a pound of coal. That pound of coal, in turn, would produce about 6,600 Btus. The ratio of energy produced to that expended is 175 Btus/1Btu.

CLIMATE AND AIR QUALITY

Impacts on climate from the proposed action cannot be addressed specifically. This is due to a lack of technical information and research work on the topic of potential impacts on climate. However, general climatic influences applicable to the proposed development can be discussed.

The modification of surface contours and albedo due to redistribution of soils and removal of vegetation may produce slight localized changes in wind speed and direction, temperature, and humidity. Impacts associated with the increased particulate emissions could also alter local climatic conditions. Reclamation with reestablishment of vegetation and a stable landscape should largely mitigate these impacts over the long-term.

The methodology for determining the air quality impact of particulate emissions consists of: 1) obtaining mine profiles for the tract from BLM; 2) obtaining emission factors for individual surface coal mining operations; 3) using the mine profile and emission factors for calculation of total emissions; 4) entering the emission data into a modified climatological dispersion model (CDMQC) for prediction of ambient concentrations; and 5) comparing predicted concentrations to Federal and State Ambient Air Quality Standards and to Prevention of Significant Deterioration (PSD) increments. The air quality impact was analyzed for the proposed tract's peak production period.

Details about the CDMQC model, emission factors, and their application appear in the technical report (separate cover).

The results of the modeling analysis were plotted on an isopleth map. The predicted concentrations were then compared with applicable air quality standards. The 1970 Clean Air Act Amendments establish primary and secondary National Ambient Air Quality Standards (NAAQS). North Dakota established air quality standards in 1969. The present Federal and State ambient air quality standards are shown in Table 11.

All pollutant sources must be evaluated to determine if PSD regulations apply. Preliminary evaluations indicate that the proposed coal mine's product emissions (coal dust) would be less than 250 tons/year; therefore, the coal mine is not a PSD source. However, the State PSD regulations specify that if the fugitive dust emissions cause the total potential particulate emissions to be in excess of 250 tons/year, then the source consumes PSD increment. These sources do not have to meet PSD regulations, but the emissions from these sources are counted against PSD increment. Table 12 shows Federal and State PSD standards.

During peak production of the mine an estimated 2,610 tons per year would be emitted, with the best available control technology applied. Fugitive dust sources would account for 97 percent of the peak production emissions.

Dispersion modeling was performed to predict particulate concentrations for comparison with State and National Ambient Air Quality Standards. Areas within the active mining area, such as the mine facilities, pit area, and reclamation areas, are not subject to these standards.

The isopleth lines on Figure 6 indicate annual average particulate concentrations that could result during peak production; the highest concentration at a location off the mine site could be 5.8 ug/m^3. This level does not exceed the allowable Class II PSD annual background concentration added (24 ug/m^3), the ambient level should not exceed State or Federal Ambient Air Quality Standards.

In addition to the annual particulate standard of 60 ug/m^3, North Dakota has a 24-hour standard of 150 ug/m^3 that cannot be exceeded more than once per year off the mine site. Figure 7 shows the predicted highest particulate concentrations for 24-hour averaging times, resulting from the proposed action. The predicted highest 24-hour values associated with the proposed action during peak production could be as high as 47 ug/m^3. This level would consume the allowable Class II PSD 24-hour increment for particulates. With the estimated 24-hour background concentration added (100 ug/m^3), the ambient level would be 147 ug/m^3. This level complies with the State Ambient Air Quality Standard and the Federal Secondary Ambient Air Quality Standards. There is a possibility that the proposed action could violate State and Federal ambient TSP standards, but this is subject to the mine emissions and the corresponding background levels in the area.

Because the proposed action totally consumes the allowable Class II PSD increments for particulates, any associated PSD source could not contribute significantly (5 ug/m^3-24-hour) to the PSD's Class II annual or 24-hour particulates increment.

Several small sources of gaseous pollutants are associated with surface coal mining operations.

During peak production, the relatively small gaseous emissions associated with the mining operations are not expected to violate air quality standards. Gaseous emissions from mining sources were not modeled because of their expected limited impacts to the air quality.

TABLE 11
COMPARISON OF AMBIENT STANDARDS
FEDERAL VS. NORTH DAKOTA

	Federal Ambient Air Quality Standards (UPA)			North Dakota Ambient Air Quality Standards	
Pollutant	Wording of Standard	Secondary Standard	Primary Standard	Primary Standard	Wording of Standard
TOTAL SUSPENDED PARTICULATES	Annual geo. mean conc.	60 ug/m^3	75 ug/m^3	60 ug/m^3	Annual geo. mean conc.
	Max. 24-hr. concentration not to be exceeded more than once per year	150 ug/m^3	260 ug/m^3	250 ug/m^3	Max. 24-hr. conc. not to be exceeded more than once per year
SETTLED PARTICULATES (Dustfall)	(At present there is no federal standard)			15 tons/ sq. mile	Max. 3-month arithmetic mean in residential areas
				30 tons/ sq. mile	Max. 3-month arithmetic mean in heavy industrial areas
COEFFICIENT OF HAZE	(At present there is no federal standard)			0.4 coh. per 1000 linear ft.	Max. annual geo. mean
SULFUR DIOXIDE	Annual arith. avg. conc.		.03 ppm (80 ug/m^3)	60 ug/m^3 (0.02 ppm)	Max. annual arithmetic mean
	Max. 24-hr. concentration not to be exceeded more than once per year		.14 ppm (365 ug/m^3)	260 ug/m^3 (0.10 ppm)	Max. 24-hr. conc.
	Max. 3-hr. concentration not to be exceeded more than once per year	.50 ppm (1300 ug/m^3)		715 ug/m^3 (0.24 ppm)	Max. 1-hr. concentration
REACTIVE SULFUR (Sulfation)	(At present there is no federal standard)			0.24 mg SO_2/100 cm^2/day	Max. annual arithmetic mean
				0.50 mg SO_2/100 cm^2/day	Max. for a 1-month period
SUSPENDED SULFATE	(At present there is no federal standard)			4 ug/m^3	Max. annual arithmetic
				12 ug/m^3	Max. 24-hr. conc. not to be exceeded over 1 percent of the time
SULFURIC ACID MIST, SULFUR TRIOXIDE OR ANY COMBINATION THEREOF	(At present there is no federal standard)			4 ug/m^3	Max. annual arithmetic mean
				12 ug/m^3	Max. 24-hr. conc. not to be exceeded over 1 percent of the time
				30 ug/m^3	Max. 1-hr. concentration not to be exceeded over 1 percent of the time

TABLE 11 (cont.)
COMPARISON OF AMBIENT STANDARDS
FEDERAL VS. NORTH DAKOTA

	Federal Ambient Air Quality Standards (UPA)			North Dakota Ambient Air Quality Standards	
Pollutant	Wording of Standard	Secondary Standard	Primary Standard	Primary Standard	Wording of Standard
HYDROGEN SULFIDE	(At present there is no federal standard)			45 ug/m^3 (0.032 ppm)	Max. ½-hr. conc. not to be exceeded more than twice in any 5 consecutive days.
				75 ug/m^3 (0.054 ppm)	Max. ½-hr. conc. not to be exceeded over twice a year
CARBON MONOXIDE	Max. 3-hr. concentration not to be exceeded more than once per year	9 ppm (10 ug/m^3)	9 ppm (10 ug/m^3)	10 ug/m^3 (9 ppm)	Max. 3-hr. conc. not to be exceeded more than once per year
	Max. 1-hr. concentration not to be exceeded more than once per year	35 ppm (40 ug/m^3)	35 ppm (40 ug/m^3)	40 ug/m^3 (35 ppm)	Max. 1-hr. conc. not to be exceeded more than once per year
OZONE	Max. 1-hr. concentration not to be exceeded more than once per year	0.12 ppm (235 ug/m^3)	0.12 ppm (235 ug/m^3)	235 ug/m^3 (0.12 ppm)	Max. 1-hr. conc. not to be exceeded more than once per year
HYDROCARBONS (Less Meth.)	Max. 3-hr. concentration (6-9 a.m.) not to be exceeded more than once per year	.24 ppm (160 ug/m^3)	.24 ppm (160 ug/m^3)	160 ug/m^3 (0.24 ppm)	Max. 3-hr. conc. (6-9 a.m.) not to be exceeded more than once per year
NITROGEN DIOXIDE	Annual arithmetic avg. concentration	.05 ppm (100 ug/m^3)	.05 ppm (100 ug/m^3)	100 ug/m^3 (0.05 ppm)	Max. annual arithmetic mean
				200 ug/m^3 (0.10 ppm)	Max. 1-hr. conc. not to be exceeded over 1 percent of the time in any 3-month period
LEAD	Quarterly arithmetic mean		1.5 ug/m^3	1.5 ug/m^3	Quarterly arithmetic mean

Sources:

National Ambient Air Quality Standards. 1978.
North Dakota Air Pollution Regulations. 1978.

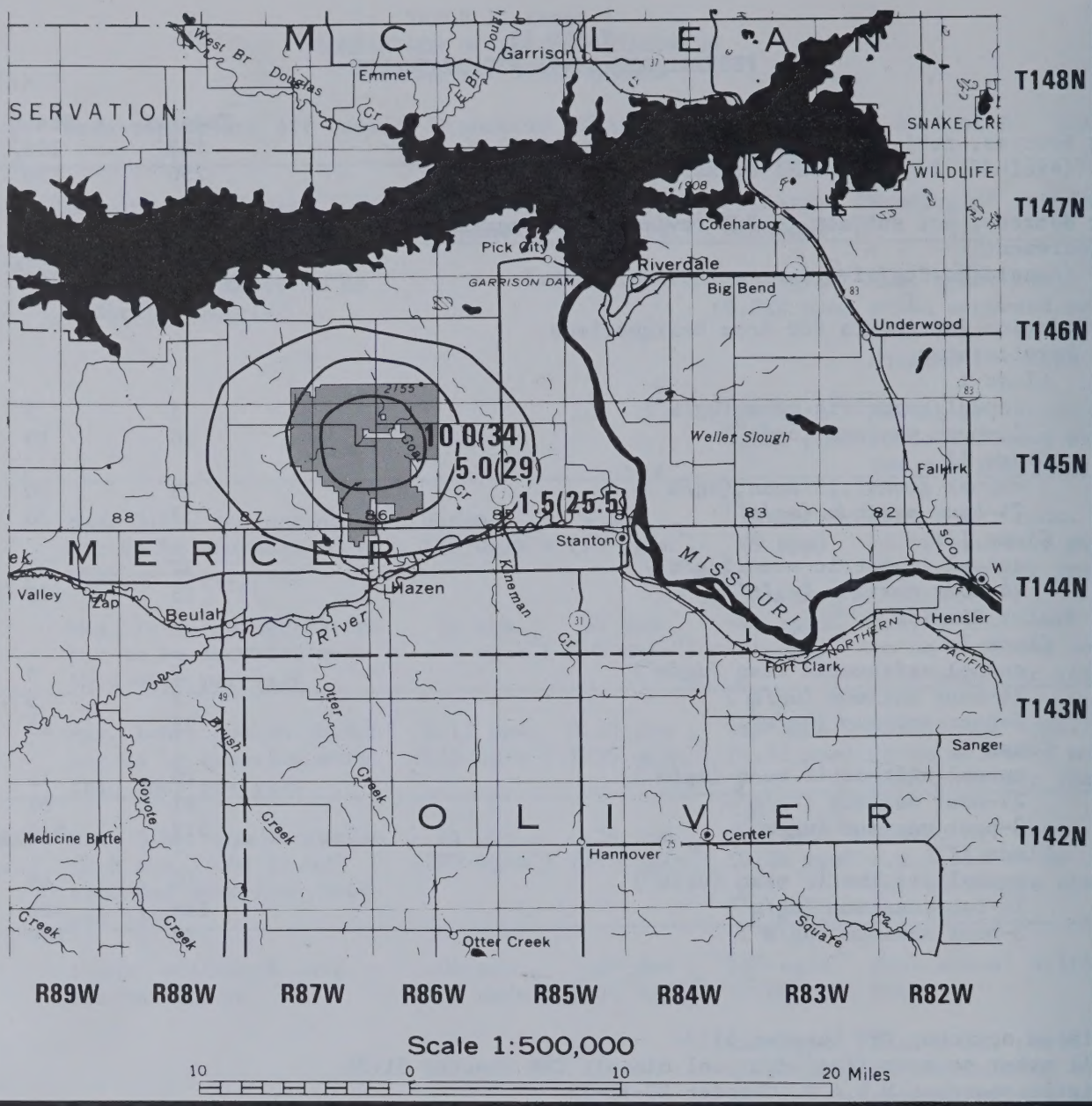
TABLE 12
FEDERAL AND STATE PSD STANDARDS

	Federal	State
Major Sources, subject to PSD review	100[1]	100[3]
(excludes fugitive dust emissions) (t/yr)	250[2]	250[4]
Major Sources, not subject to PSD review-counts against PSD increment	100[1]	100[3]
(considers fugitive dust emissions) (t/yr)	250[2]	250[4]
Deterioration Increments for Area Designations		
Particulates		
Class I		
annual geometric mean (ug/m^3)	5	5
24-hour maximum (ug/m^3)	10	10
Class II		
annual geometric mean (ug/m^3)	19	10
24-hour maximum (ug/m^3)	37	30
Class III		
annual geometric mean (ug/m^3)	37	37
24-hour maximum (ug/m^3)	75	75
Sulfur Dioxide		
Class I		
annual arithmetic mean (ug/m^3)	2	2
24-hour maximum (ug/m^3)	5	5
3-hour maximum (ug/m^3)	25	25
Class II		
annual arithmetic mean (ug/m^3)	20	15
24-hour maximum (ug/m^3)	91	91
3-hour maximum (ug/m^3)	512	512
Class III		
annual arithmetic mean (ug/m^3)	40	40
24-hour maximum (ug/m^3)	182	182
3-hour maximum (ug/m^3)	700	700

1. Listed sources; CFR Chapter 51:24
2. All other sources (includes coal mines); CFR Chapter 51:24
3. Listed sources; N.D.A.C. Chapter 33-15-15
4. All other sources (includes coal mines); N.D.A.C. Chapter 33-15-15

*SOURCES

Prevention of Significant Deterioration of Air Quality. 1978. Chapter 33-15-15 NDAC
Requirement for Preparation, Adaption and Submittal of Implementation Plan. 1978. Title 40 CFR, Part 51.



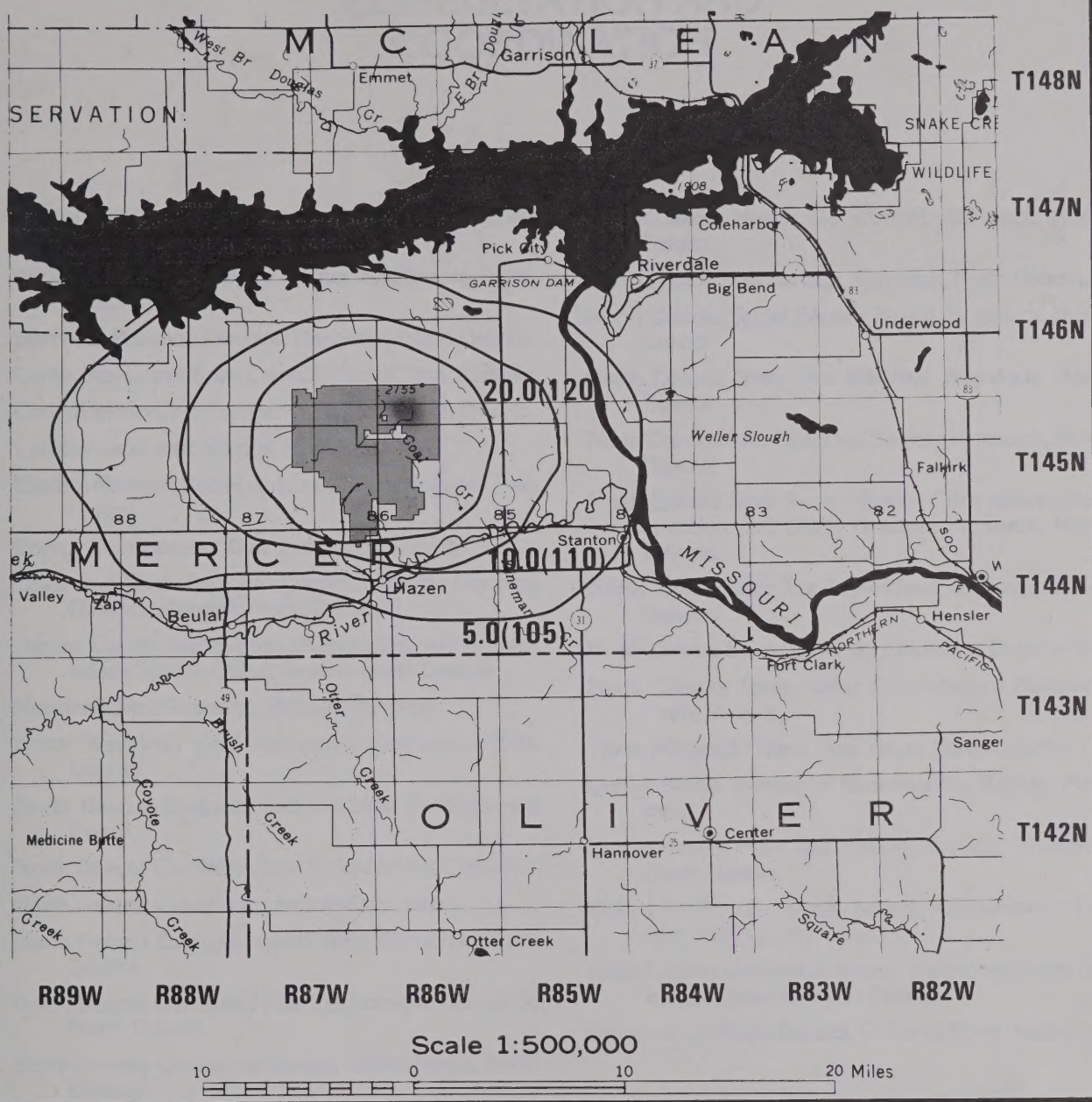
Truax Tract

-N-

TSP Annual Average Concentration (ug/m^3) Isopleths

Note: Number in parenthesis indicates predicted concentration plus background concentration.

FIGURE 6



Truax Tract

-N-

TSP Maximum 24-hour Concentration (ug/m^3) Isopleths

Note: Number in parenthesis indicates predicted concentration plus background concentration.

FIGURE 7

CHAPTER IV
CONSULTATION AND COORDINATION

The following organizations were consulted during the production of this document.

Badlands Human Service Center; Dickinson, North Dakota.

Bismarck Planning Director; Bismarck, North Dakota.

Center Mayor and Town Council; Center, North Dakota.

Consolidation Coal Company; Stanton, North Dakota.

Cumin Associates; Billings, Montana.

Eastern Montana Social and Community Services Task Force.

Energy Development Board of Mercer County.

Lewis and Clark Regional Council Mandan Planning Director; Mandan, North Dakota.

Mercer County Agricultural, Stabilization and Conservation Service Office; Beulah, North Dakota.

Mountain West Research; Billings, Montana.

North American Coal Company; Bismarck, North Dakota.

North Dakota Business and Industrial Development Board.

North Dakota Combined Law Enforcement Council.

North Dakota Community Action Association.

North Dakota Energy Impact Office; Bismarck, North Dakota.

North Dakota Game and Fish Department; Bismarck, North Dakota.

North Dakota Geological Survey; Grand Forks, North Dakota.

North Dakota Health Department; Bismarck, North Dakota.

North Dakota Job Service; Bismarck, North Dakota.

North Dakota Social Service Board; Bismarck, North Dakota.

North Dakota State Fire Marshall; Bismarck, North Dakota.

North Dakota State Historical Society; Bismarck, North Dakota.

North Dakota State Public Service Commission, Reclamation and Siting Division; Bismarck, North Dakota.

North Dakota State Tax Department; Bismarck, North Dakota.

North Dakota State University, Sociology Department.

North Dakota State Water Commission; Bismarck, North Dakota.

Three Affiliated Tribes; New Town, North Dakota.

United States Bureau of Reclamation; Billings, Montana.

United States Fish and Wildlife Service; Bismarck, North Dakota.

United States Geological Survey, Conservation Division; Billings, Montana.

United States Geological Survey, Water Resources Division; Bismarck, North Dakota.

University of North Dakota, Office of Rural Health.

REFERENCES

Brum, L. J., J. W. Enz and J. M. Ramirez. 1978. The implications of coal development on the atmospheric environment and plant ecosystems of selected sites in Western North Dakota (Climatology of Inversions). Final report to Surface, Environment and Mining (SEAM). U.S. Forest Service, Cooperative Agreement No. 16-418-GR. Department of Soils, NDSU Agricultural Experiment Station. 58 p.

Center, North Dakota, Mayor and Town Council. 1981. Personal Communication.

Croft, M. G. 1970. Ground Water Basic Data Mercer and Oliver Counties, North Dakota. U.S. Geological Survey Water Resources Division. Bismarck.

. 1973. Ground Water Resources Mercer and Oliver Counties, North Dakota. U.S. Geological Survey Water Resources Division. Bismarck.

Crawley, Mark E. and Douglas G. Emerson. Hydrologic Characteristics and Possible Effects Related to Surface Mining in an Antelope Creek Tributary Basin, Mercer, County, North Dakota. U. S. Geological Survey, Water Resources Division. Unpublished. Bismarck.

Davis, L. B. 1977. Archaeological Photo Interpretation and Feasibility Study of a Five County Area in West Central North Dakota Using Small Scale (1:80,000) Aerial False Color Infared. U.S. Bureau of Land Management. Dickinson.

Dill, C. L. 1976. Archaeological and Historic Site Survey of North American Coal Corporation's Indianhead Mine, Limited and Extended Mining Plan Areas, Mercer County, North Dakota. State Historical Society of North Dakota. Bismarck.

. 1978. 1977 Cultural Resources Inventory: Antelope Valley Station/A.N.G.C.G.C. Gasification Plant Site, Associated Mining Areas and Ancillary Facilities. State Historical Society of North Dakota. Bismarck.

Fox, R. et al. 1976. Archaeological and Historical Studies in the Vicinity of the Proposed Coyote Station Electrical Generation Plant Site Near Beulah, North Dakota. University of North Dakota. Grand Forks.

Frovarp, Steve. 1981. Personal Communication. Mercer County Planner.

Groenwald, G.H. and R.W. Rehm. 1980. Instability of Contoured Surface-Mined Landscapes in the Northern Great Plains: Causes and Implications, in Adequate Reclamation of Mined Lands? March 26-27. Paper No. 2:1-15. Billings, Montana.

, et al. 1979. Geology and Geohydrology of the Knife River Basin and Adjacent Areas of West Central North Dakota. North Dakota Geological Survey R.I. No. 64.

. 1980. Potential Hydrogeochemical Impacts of Surface Mining in the Northern Great Plains. in Surface Mining Hydrology, Sedimentology, and Reclamation. University of Kentucky. Lexington.

Jensen, R. E. 1972. Climate of North Dakota. North Dakota State University. Fargo. 48 p.

Mountain West Research. 1981. Computer Printouts Containing Population and Employment Forecasts. Unpublished. Billings, Montana.

National Ambient Air Quality Standards. 1978. Title 40 CFR, Part 50.

North Dakota Air Pollution Regulations. 1978. North Dakota Ambient Air Quality Standards. Chapter 33-15-02.

North Dakota Crop and Livestock Reporting Service. 1980. North Dakota Agricultural Statistics. North Dakota State University Agricultural Experiment Station and United States Department of Agriculture, Economics, Statistics Service. Fargo.

North Dakota Game and Fish Department, U.S. Bureau of Land Management, and U.S. Fish and Wildlife Service. 1981. Wildlife Unsuitability Criteria Application Report and Recommendations. Dickinson, North Dakota.

North Dakota Public Service Commission, Reclamation and Siting Division. 1980. Rules and Regulations Adopted by North Dakota, Effective August 1, 1980, Governing the Reclamation of Surface Mined Lands Under Chapter 38-14.1 of the North Dakota Century Code. Bismarck.

Pedco Environmental, Inc. 1978. Survey of fugitive dust from coal mines.

Power, J. F. et al. Can Productivity of Mined Land be Restored in North Dakota? North Dakota Agricultural Experiment Station Farm Research. 31:30-32.

Prevention of Significant Deterioration of Air Quality. 1978. Chapter 33-15-15 NDAC.

Ramirez, J. M. 1972. The agroclimatology of North Dakota, Part 1. Air temperature and growing degree days. Extension Bulletin No. 15. North Dakota State University. Fargo. 30 p.

. 1973. The agroclimatology of North Dakota, Part 2. Precipitation: forecast probabilities and rainmaking. Extension Bulletin No. 16. North Dakota State University. Fargo. 44 p.

. and T. Method. 1976. An air pollution climatology of a seven county area in Western North Dakota: Final report to North Dakota State Department of Health, Cooperativie Agreement No. 2520-513-5120. Department of Soils, NDSU Experiment Station. 70 p.

Requirements for Preparation, Adaption and Submittal of Implementation Plan. 1978. Title 40 CFR, Part 51.

Roberson, W. 1980. West Study Area South Beulah Mine Extension, Mercer County, North Dakota. Cultural Resources Survey and Testimony. University of North Dakota. Grand Forks.

Shaver, J. C. 1977. North Dakota Rangeland Resources. Society for Range Management/Old West Regional Range Program. Bismarck.

Stearns—Roger Incorporated. 1977. Environmental Analysis of the Antelope Valley Station. Mercer County, North Dakota.

U. S. Dept. of Agriculture, Soil Conservation Service. 1971-1980. Official Soils Series Descriptions.

. 1978. Soil Survey of Mercer County, North Dakota.

U. S. Dept. of Commerce, National Climatic Center. Undated. STAR Data for Bismarck, North Dakota (1948-1974). Ashville, North Carolina.

. 1973. Climatography of the United States No. 81. Ashville, North Carolina.

. 1979. Climatological Data, annual summary, North Dakota. Ashville, North Carolina.

U. S. Dept. of Interior, Bureau of Land Management. Undated. Archaeological Site Forms. Unpublished. Dickinson, North Dakota.

. 1977. Resource and Potential Reclamation Evaluation Beulah Trench. EMRIA Report No. 10.

. 1981. Draft Report—Resource and Potential Reclamation Evaluation, North Beulah Study Area, North Dakota.

U. S. Environmental Protection Agency. 1974. Development of emission factors for fugitive dust sources. EPA-450/3-74-037.

. 1978. Mobile sources emission factors. EPA-400/9-78-005.

. 1979. Compilation of air pollutant emission factors. AP-42.

., Region VIII. 1979. Interim policy paper on the air quality review of surface mine activities.

Waldrun, Dave. 1981. Personal Communication. Lewis and Clark Regional Council.

Wocken, W. C. 1981. Personal Communication. Bismarck City Planning Director.

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SUMMARY MATRIX
TRUAX TRACT
RESOURCE AND ENVIRONMENTAL CONSIDERATIONS

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECT OF LEASING/DEVELOPMENT	SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
Topography	Hummocky, small hills of till and closed depressions.	Less contrasting topography with slight modification of drainage patterns.	Low	Good	
Geology and Minerals					
Geologic Hazards	None Identified	None	N/A	Good	
Potential for Other Minerals	Low (Oil and Gas) - This tract is in the Williston Basin.	Low - There has been exploration activity in the area	Mining could interfere with development of oil and gas.	Good	
Paleontological Resources	Low - None identified to date	Will improve knowledge of the resources near the mine.	Low	Good	
Soils and Reclamation Potential					
Soil Erosion Potential	Wind and Water - Low over most of tract	Slight increase with soil handling operations but little overall change.	Minimal	Outstanding	
Toxic Elements in Soil	No problems	None	None	There has not been a need for this data.	
Chemicals Corrosive to Metal or Concrete in Soil	Corrosivity of most soils to: Untreated steel - High; Concrete - Low	None	None	Outstanding	

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECT OF LEASING/DEVELOPMENT	SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
Highly Saline/ Sodic Soil Conditions	About 500 acres in the tract is saline/sodic	These areas can possibly be improved by replacing with better plant growth material from surrounding soils and/or the overburden.	Minimal - slight increase in overall productivity.	Outstanding	
Character of Subsurface Material and/ or Interburden	A mantle of glacial till overlies residual shale, siltstone, and sandstone over most of the tract. Most glacial till is suitable for use in reconstructing soil profiles. Some of the residual material may also be suitable based on the core drill holes 8 miles to the west in the North Beulah and Renners tracts.	Some instability problems (settling, piping) may appear with the onset of reclamation. Some of the overburden could be used to improve areas with soils rated "poor" for final cover of surface-mined land.	Minimal	Outstanding	
Reclamation Potential					
Based on soil suitability for final cover of surface mined land, the chance for successful reclamation of most individual landowner's holdings and for the tract as a whole appears to be high. However, there are two separate parcels (80 acres each) that have nearly half or more of their acreage rated "poor". These may require a very intensive reclamation effort to ensure successful rehabilitation.				Outstanding	
The breakdown of soil suitability from Table 2 are as follow: "Good" - 17,960 acres, 77%; "Fair" - 4,006 acres, 17%; and "Poor" - 1,475 acres, 6%. About 900 of the 1,475 acres rated "poor" are Ustorthents or mine spoils from previous coal mining activity.					
Precipitation could be a limiting factor for reestablishing vegetative cover some years.					

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECT OF LEASING/DEVELOPMENT	SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
Hydrology					
Drawdown of Shallow Groundwater Levels	Many wells in and surrounding the tract rely on shallow groundwater for domestic and livestock supplies.	Wells finished in the mine disturbance zone near an open pit will have lowered water levels during mining.	Will affect between 20 and 50 wells used for domestic and livestock purposes.	Hydrology - Acceptable Well Inventory - Acceptable	This will be a short-term impact that will only occur to a few wells at a time as mining progresses through the tract.
Degradation of Groundwater Quality	Lignite water does not meet Public Health Service drinking water quality standards. It is acceptable for domestic and stockwater purposes since it is the best practical source.	Groundwater quality will be degraded in the tract and this impact can move down gradient into the surrounding unmined aquifer.	Will affect between 8 and 23 wells used for domestic and livestock purposes.	Hydrology - Acceptable Well Inventory - Acceptable Impact Prediction - Acceptable	The long term impact of how far down gradient poor water quality will move is not known.
Vegetation					
Cropland	There are 9,081 acres of land in the tract that are currently being cropped.	Average annual loss of 190 acres excluding 3652 total acres of summer fallow. Annual production on this 190 acres would be 4750 bu. of wheat. Maximum loss in any one peak year would be 1884 acres and 47,100 bu. of wheat.	Moderate to high, depending upon individual operation. Low to moderate for overall tract production.	Good	
Rangeland	Average annual production is 4,469 AUMs.	Average annual loss of 90 AUMs. Each acre would be out of production from 10 to 15 years. Maximum loss for any one peak mining year would be 1788 acres and 894 AUMs.	Moderate to high, depending upon individual operation. Low to moderate for overall tract.	Good	

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECT OF LEASING/DEVELOPMENT	SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
Agriculture	There are 56 operators in the tract. 37% of the involved operators' acreage is in the tract.	The same number of operators will be affected, to varying degrees, by a long-term but temporary loss of acreage for agricultural production.	Very significant to the operators involved	Outstanding	
	49% of the acreage in the tract is operated by lessees.	Non-owners will lose the use of their leased acreage with no compensation.	Significant to non-owners.	Outstanding	
Threatened or Endangered Species	There are no threatened or endangered species (on the Federal List) in the tract.	None	None	Good	
Land Use	Agricultural use. Minor roads and local utilities.	Temporary displacement of existing use. Relocation or bypass of existing roads and utilities.	Short term. See Vegetation and Agriculture sections. Minor inconvenience.	Acceptable	
Recreation Values	Less than 5% of tract used for recreation.	Loss of recreational areas and added stress on available recreational opportunities.	Limited recreational opportunities make impacts significant	Good - Based on current studies.	

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECT OF LEASING/DEVELOPMENT	SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
Aesthetics	Agricultural, dynamic of high visual quality but low scenic value, observed from State Highway 200 and Hazen Region, includes coal mining.	Short term changes in views to less desirable scenery until after reclamation. Views are expected as they conform to visual appearance of the region. Views from the town of Hazen would be an undesirable loss of amenity.	Short term of moderate to low significance. Long-term effects insignificant. Significant loss of aesthetic amenity in views from Hazen.	Acceptable	
Wildlife					
Sensitive Wildlife and Essential Habitats	Sensitive wildlife habitat - 30-70% of the areas for 30 sensitive wildlife species. Whooping crane and northern swift fox are identified with the area.	Coal mining and attendant actions would severely disrupt and destroy locally significant wetlands and woodlands interspersed with native prairie which singly and in composit constitute the essential habitats for 30 sensitive wildlife and many more common wildlife. Off-site aquatic habitats of Otter, Coyote, Brush and Spring Creeks and the Knife and Missouri Rivers, and the Garrison Reservoir would be recipients of potential point and non-point pollution.	There would be a significant area loss to wildlife resources if strip mining occurs in the essential wetlands, woodlands and native prairie.	1980 CIR aerial photo interpretation by Fish & Wildlife Service, Western Energy and Land Use Team. Unsuitability Criteria application team (FWS, DSGF, & BLM Biologists). Wildlife data quality is high.	To date there are no direct successful recreation (compensation) of native woodlands and wetlands after strip mining in this country. Native prairie comprised of native plant species has not been recreated from mine spoil. If some form of habitat replacement is achieved during mining and thereafter, then the negative impacts to wildlife resources would be proportional to the successful compensation.
General					Increased poaching and disturbance would significantly reduce all wildlife populations in the region. If not controlled, it would significantly reduce recreation opportunities.

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECT OF LEASING/DEVELOPMENT	SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
Cultural/ Historical Values	No specific data available. Resources are likely on the tract but it is unlikely that they will prevent mining.	Loss of sites as a result of mining activity.	Unable to be specific, but unlikely that cultural resources will have a major impact on mining.	Data rated unreliable because no data available.	Survey not conducted on tract because data available from vicinity of tract.
Net Energy Analysis	No fossil fuels are being produced from this tract.	A total of 5.6 million tons of coal (0.6 million tons of federal coal) will be produced annually.	Production: 6919 Btu/lb. of coal Consumption: 37.7 Btu/lb. of coal Ratio of production to consumption 184:1	Acceptable	
Climate and Air Quality	Good	Totally consumes the allowable class II PSD 24-hour increment for particulates.	Significant	Fair	Any associated PSD source could not contribute significantly ($5ug/m^3$ - 24-hour) to the PSD's class II 24-hour particulates increment.

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECT OF LEASING/DEVELOPMENT	SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
		Social and Economic Conditions			
Employment	Communities of Beulah, Stanton, and Center have two or more inadequate services with present employment/population.	Employment increases will occur in Beulah, Stanton and Center	Moderate employment changes - Beulah, Stanton, Center	Outstanding	
Population	Communities of Beulah, Stanton, and Center have two or more inadequate services with present population.	Population increases will occur in Beulah, Stanton and Center.	Moderate population changes - Beulah, Stanton and Center	Outstanding	
Regional Income	$4560 estimated regional income per capita	Minor increases in regional per capita income	Insignificant	Acceptable	
Infrastructure Assessment (Community Services)	Beulah - 2 inadequate services Stanton - 2 inadequate services Center - 3 inadequate services	1990 Full Operations Beulah with tract - 3 inadequate services w/o tract - 2 inadequate Stanton with tract - 7 inadequate services w/o tract - 3 inadequate Center with tract - 12 inadequate w/o tract - 12 inadequate	Significant changes in public service adequacy	Good	Community services which are inadequate without tract related population growth would experience additional strains due to increased demands on an inadequate service situation. Based on assessment of 15 community services.
Perceptions of Community Services	Mercer County - Law enforcement, recreational opportunities, medical care, and retail opportunities identified as service problems. Oliver County - Medical care service shortages identified.	Not applicable	Not Applicable	Mercer - Acceptable Oliver - Unsatisfactory	

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECT OF LEASING/DEVELOPMENT	SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
Social Attitudes	Mercer - 17 interviews Residents - approximately 3/4 expressed support for coal mining. Officials - same as residents Oliver - 6 interviews Residents - typically supportive of mining. Officials - unanimously supportive of mining. Stated Concerns - Air pollution, pressure on schools, reclamation, water availability, social effects.	Not Applicable	Not Applicable	Mercer - Acceptable Oliver - Unsatisfactory	
Quality of Life	Mercer & Oliver Favorable characteristics - area aesthetics, outdoor recreation, and small town, uncrowded social environment. Unfavorable - retail opportunities, harsh climate, entertainment facilities, medical care and presence of persons dissimilar to long term residents.	Population growth related to Truax Mine might produce some further reduction in area satisfaction among those residents presently concerned with changes in communities.	No pronounced changes. Area attributes should not be seriously jeopardized	Mercer - Acceptable Oliver - Unsatisfactory	

TRUAX TRACT
UNSUITABILITY CRITERIA RESULTS

Criterion	Applicable to Tract	Exception Used (if applicable)	Additional Data Needed	Comments
1. Federal land systems	No	---	No	---
2. Rights-of-way and easements	No	---	No	---
3. Buffer zones	Yes	No	No	Exceptions may be applied at mine plan.
4. Wilderness study areas	No	---	No	---
5. Scenic areas	No	---	No	---
6. Land used for scientific studies	No	---	No	---
7. Historic lands and sites	No	---	No	---
8. Natural areas	No	---	No	---
9. Federally listed endangered species	Yes, whooping crane and northern swift fox known or believed to use these regions.	---	Swift fox data very limited.	Exclusion of strip mining from wetlands would protect most whooping crane areas.
10. State listed endangered species	No	---	No	None exist.

Criterion	Applicable to Tract	Exception Used (if applicable)	Additional Data Needed	Comments
11. Eagle nests	No	---	No	None
12. Eagle roosts and concentration areas	No	---	No	---
13. Falcon cliff-nesting sites	No	---	No	---
14. Migratory birds	Yes	Yes, interagency team applied exceptions as suitable for mining with stipulations.	No	Seven species in combination with Criterion 15.
15. State resident fish and wildlife	Yes	Yes, interagency team applied exceptions as suitable for mining with stipulations.	No	About 30 species in combination with Criterion 14.
16. Flood plains	No	---	No	---
17. Municipal watersheds	No	---	No	---
18. National resource waters	No	---	No	---
19. Alluvial valley floors	No	---	No	---
20. State proposed criteria	No	---	No	None exist.

PRELIMINARY FACILITY EVALUATION REPORT

PRELIMINARY FACILITY EVALUATION REPORT

GOALS AND OBJECTIVES

The Fort Union Regional Coal Team, in its consideration of leasing federal coal, will address the likely coal end-uses and their implications. The purpose of evaluating how the coal will be used is to present the most probable major impacts of development.

The end-use facility evaluations are at a reconnaissance level and the reports are presented only as general approximations of facility characteristics and impacts.

The uncertainty of actual end-use facilities and the inherent problems in defining a "typical facility" limit end-use analysis to broad generalizations. The evaluations are not meant in any way to substitute for detailed site specific evaluations, EISs, or analyses which come later when mining and facility projects are actually proposed. The end-use facility evaluations will not preclude any federal, state, local, or private decisions concerning actual end uses, facility siting, or end-use restrictions. The end-use reports are meant only to provide additional information to be used in decisions concerning the leasing of federal coal in the Fort Union Region and should not prejudice any later decisions.

End-use evaluations, referred to as preliminary facility evaluation reports, have been prepared for those tracts for which a new coal-use facility is expected to be built. One of the three proposed end-use facilities has been assigned to those tracts based on expressions of interest, tract size, or existing facilities. The typical facilities to be considered are: a 250 million standard cubic feet per day gasification plant; a 1,000 megawatt electric power generation plant; and an 85,000 barrel per day indirect coal liquefaction plant.

Part I of the report summarizes what the assigned typical end-use facility might be like. The description of the facility gives plant size, process technology, plant requirements (fuel, land, water, power), emissions, and other characteristics of facilities likely to be proposed in the Fort Union Region. The description includes ancillary facilities and a discussion of construction and operational aspects of the facility that are relevant to determining impacts that could occur in the vicinity of the tract.

The facility description is based on existing analyses, studies, environmental impact statements, and consultation with State and industry representatives. Part II of the facility report is an analysis of the facility impacts on the tract area.

The preliminary facility evaluation reports will be used by the Regional Coal Team to rank federal coal tracts with a better understanding of likely future development impacts and implications.

PART I

ASSUMPTIONS AND VARIABLES

The typical electric power facility characteristics are based on numerous assumptions and reasonable values for important variables. Some of the assumptions and variables are based on best estimates. Others are based on existing literature, facilities, and on input from industry sources.

Facility Location, Type, and Size

Because of the economics of lignite coal, it was assumed in the early stages of the Fort Union coal leasing process that the end-use facilities would be near the tracts to be leased. The energy value of lignite coal as well as the water content make the transporting of lignite for long distances uneconomical. For purposes of issue level impact analysis, the electric power facility assigned to the Truax tract is not specifically located but assumed to be near the tract. Such an assumption will eliminate the problems of arbitrarily siting facilities. Facilities were sited, however, for the air quality modeling. Where specific site location information was available from potential project developers it was used in the facility analysis.

The proposed electric power facility will produce 1,000 megawatts (gross) of power. The coal-fired electric power plants being constructed or planned in the region generally have from one to three generation units; each producing from 400 to 500 megawatts of power. A facility consisting of two 500 MW units was chosen to be representative of a typical electric power facility.

Construction Period

The construction time span for an electric power facility can vary greatly. A company hiring four to five thousand construction workers could complete the proposed facility in as short a time span as three years. A company could choose to lengthen the construction period or build parts of the plant capacity in two or more construction phases. This would reduce the construction work force and spread construction over as many as ten years.

The assumption is that the facility will be constructed in phases. For the two unit electric power plant, the second unit would begin construction in the third year after the first unit is begun. The total construction period would cover approximately eight years.

Employment

The construction work force will be a function primarily of the construction schedule. Work force numbers were supplied by the Basin Electric Power Cooperative. The average yearly employment figures are based on the projected work force for the Antelope Valley Power Plant.

Water Requirements

Water demands for an electric power facility depend on production technology, plant load factor (percent of output capacity), operation time, and water quality. The values used for water requirements are based on estimates from Basin Electric. The value for gallons per minute is an estimate of average water use for the facility. The yearly requirements are an approximation based on an operation factor assumed for the facility. This operation factor indicates the time the facility will be in operation each year. The electric power facility will assume an average load factor since peak power will not be needed full time due to varying load demand.

For analysis purposes, water for the electric power facility is assumed to come from Lake Sakakawea.

Emissions

The air emissions for the electric power plant will depend primarily on the facility's production process, the amount and quality of coal burned, and the level of pollution control.The electric power facility would use approximately 10 percent of the gross wattage it produces. An assumption affecting air emissions from a generic facility is the quality of the coal. The sulfur, ash, and water content of the lignite will not only influence emissions per ton of coal burned, but will also determine the amount of coal required for a given facility. The air emissions from any type of coal conversion facility will be a function of the conversion process characteristics and the emission control technology used at the facility and the level of control used.

The impacts resulting from air contaminants emitted by the coal end-use facility are deduced by using established air quality standards above which deleterious effects of the contaminants are implied to occur. A facility's ability to meet air quality standards assumes there would be no significant deleterious effects to human health, animals, or vegetation. Such an assumption is the subject of continuing discussion and is disputed by certain research studies. A more detailed discussion of this issue can be found on pages 37-94 in the Final West-Central North Dakota Regional Environmental Impact Study on Energy Development (October 1978). The facilities could also emit certain pollutants for which there are no standards. The anticipated levels of air quality concentrations of contaminants are obtained by measuring existing levels of air quality and adding computer simulation of the atmosphere loading resulting from the end-use facility.

The air quality impacts are considered in terms of ambient air standards and prevention of significant deterioration standards. Under authority of the Clean Air Act of 1970, the State of North Dakota has promulgated its own ambient air quality standards which are equal to or more stringent than the Federal standards. The purpose of the North Dakota Ambient Air Quality Standards is to control the quality of the air over North Dakota such that, a) the health of sensitive and susceptible segments of the population will not be adversely affected; b) concentrations of pollutants will not cause public nuisance or annoyances; c) significant damage to animals, ornamental plants, forest and agricultural crops will not occur; d) visibility will not be significantly reduced; e) metals or other materials will not be significantly corroded or damaged; f) fabrics will not be soiled, deteriorated, or have their colors affected; and g) natural scenery will not be obscured.

In May of 1977, the North Dakota State Department of Health (NDSDH) received a delegation of responsibility from the Environmental Protection Agency (EPA) for administration of the Prevention of Significant Deterioration (PSD) program and regulations adopted by EPA. The NDSDH had previously adopted PSD regulations, recognizing that the protection of the air quality resource was in the interest of preserving a quality of life and the environment both endowed to North Dakota's citizens.

During 1975, 1976, 1977, and 1978, the NDSDH received applications for and granted air quality permits to new sources in west-central North Dakota. All new sources placed into operation after January 6, 1975, are subject to the provisions of the PSD regulations of EPA and adopted by the NDSDH.

The Clean Air Act Amendments of 1977 designated three levels of allowable deterioration of air quality in regions where air quality was better than the National Ambient Air Quality Standards. All of North Dakota was defined as a Class II area with exception of four smaller areas which were defined as Class I areas. These Class I areas are the Theodore Roosevelt National Park north unit, south unit, and Elkhorn Ranch and the Lostwood National Wildlife Refuge.

The assessment analysis of proposed air quality impacts (deterioration) by proposed new sources is achieved with computer models. These models simulate the physical processes of atmospheric transport, dispersion, chemical transformation, and removal of air contaminants with resulting levels of concentrations of the contaminants. Modeling has been and remains the only tool available to determine air quality impacts of proposed sources or source modifications, since these new sources are not yet producing air contaminant emissions.

The computer modeling assessments of impacts led the NDSDH to declare in 1979 that the increment of allowable Class I area air quality deterioration for sulfur dioxide (SO_2) had been consumed and allocated to the new sources which had been granted construction permits from 1975. This decision further implied that no additional sources could construct and operate within the geographic corridor bounded by the units of the Theodore Roosevelt National Park and the sources located eastward.

An extensive, detailed discussion of the preceeding paragraphs has been published in the Final West-Central North Dakota Regional Environmental Impact Study on Energy Development (October 1978). Copies are available from the NDSDH.

Recently, several applications for permits to construct air pollution sources have been submitted to the North Dakota State Department of Health. According to the applicants' analyses, which utilize more advanced modeling techniques, compliance with all applicable standards was demonstrated.

The NDSDH is currently evaluating these applications as to the appropriateness of the air quality technique. The Department is concurrently establishing its own mesoscale air quality modeling technique in an attempt to standardize the methodology and air quality modeling input data variables. Once this has been accomplished, the actual merits review for each new application can begin.

The limiting case appears to be the question of increment consumption over the Theodore Roosevelt National Park, a Class I area. Ambient Air Quality Standards and PSD Class II increments have not previously prevented the granting of an air quality permit.

At this point in time, no new conclusion regarding the status of the Class I increment has been reached by the NDSDH. If any increment remains, permits would be granted, probably on a first-come first-serve basis, to as many of the applicants as the available increment would allow. Should the NDSDH continue to find that the increment has been consumed, no permits to construct would be granted.

If permits are not granted, the applicants may pursue the variance procedures provided by the Clean Air Act and State Regulations. Applicants may also decide to pursue an offset mechanism which would best suit their individual situation(s).

Given the above existing new source situation, the quantification of air quality impacts resulting from additional facilities associated with certain coal lease tracts is impossible. Discussion of site specific impacts without addressing the interactive and cumulative impacts would have little decision value.

For the purpose of this analysis, each end-use facility which has been assigned to a particular coal lease tract will be discussed. This discussion will contain general statements regarding facility impacts on the air quality. Impact analysis will be based on previous air quality modeling experience and past actions by the Department in permitting similar facilities. Comparisons to applicable standards can be accomplished. For example, when considering these facilities (electrical generating facility or synfuel facility) by themselves, the Ambient Air Quality Standards can be met. Also, the PSD Class II Standards can be met. This is known because these types of facilities have been permitted in the past.

The general statements will be appropriate only within the context of some qualifying conditions. A facility's impact on a given receptor is directly proportional to its distance from that receptor. Generally speaking, the closer a facility is to a receptor, the greater its impact. Therefore, considering the given type and size of facilities, a screening, modeling exercise must be undertaken in order to determine the distance a facility must be removed from the park in order to meet the Class I Standard. This distance will be compared to the distance each end-use facility associated with the coal lease tract is from the Class I area.

The approach mentioned above will only demonstrate compliance/noncompliance with the applicable standards without consideration of interaction with other sources. This analysis cannot be substituted for a detailed permit review and care must be taken to use this information with the proper qualifiers and not be taken out of context.

Solid Wastes

Estimates of solid wastes from the facility are based on figures from Basin Electric. Estimates for ash and sludge could vary considerably depending on the ash content of the coal and the pollution control technology used. Planned facilities are proposing to dispose of solid wastes in the nearby mines.

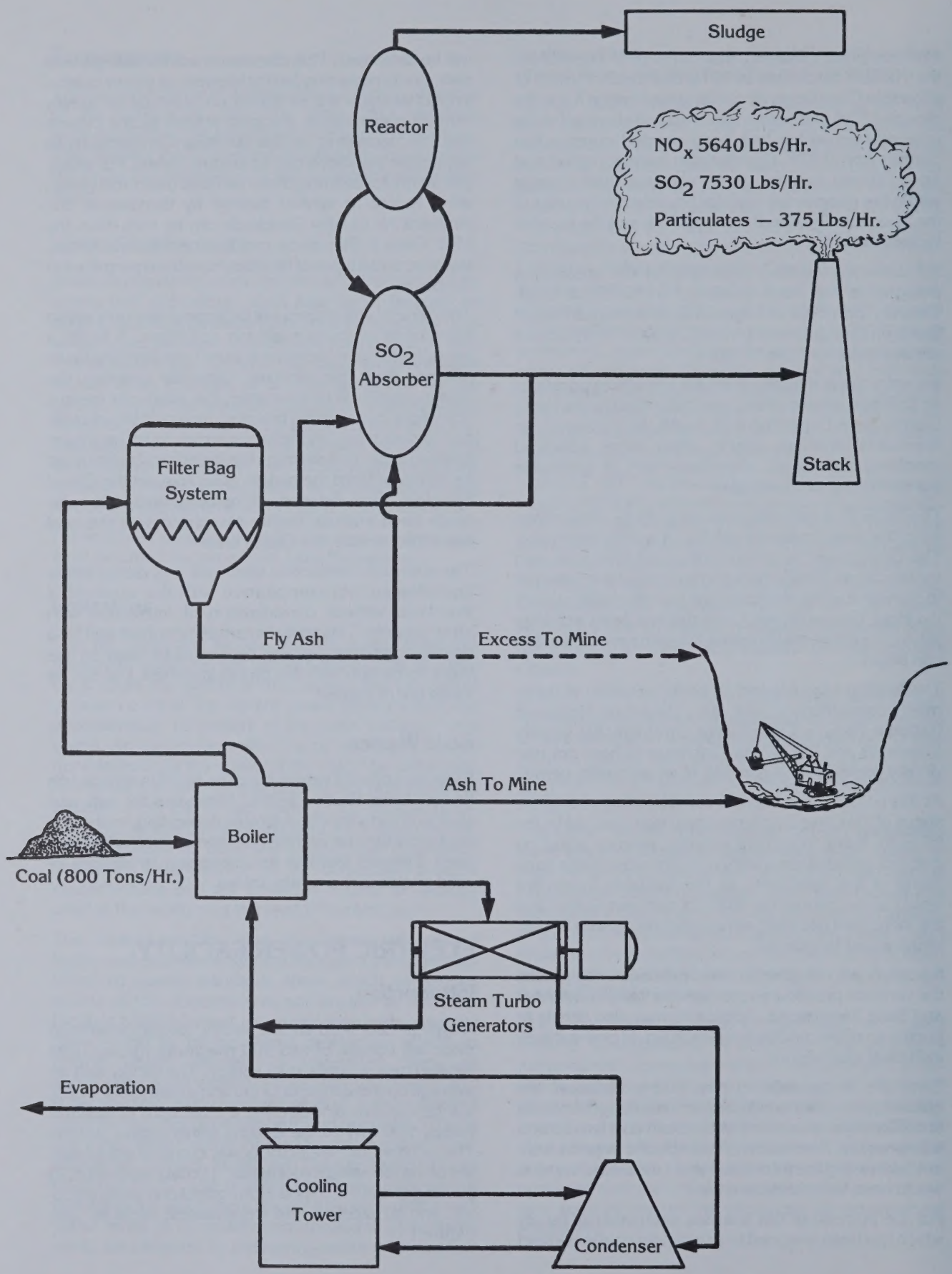
ELECTRIC POWER FACILITY

Introduction

A typical coal fired steam electric power generation plant will consist of two 500 megawatt (gross) units located near a lignite coal source. The facility with an average operation factor of .90 and a load factor of .85, will be capable of delivering a maximum of approximately 900 MW to the existing transmission system. The facilities for the electric power complex would consist of the following major areas: 1) coal preparation, 2) power generation, 3) pollution control and waste disposal, and 4) pipeline and transmission facilities. See Figure 1.

Figure 1

TYPICAL ELECTRIC POWER FACILITY



The total land area dedicated to the electric power generation facility would be approximately 600 acres. The main building at the facility site will house the boiler and turbine units. Other structures at the site will include facilities for coal handling, cooling water, air pollution control, and administration.

Employment

The construction of two electric power generation units is expected to last approximately eight years. The average annual number of workers required for plant construction will peak in the third year of construction when substantial work on both units would be underway. The peak construction work force is expected to be approximately 1,900 workers in the second quarter of the third year. Once in operation, the facility will permanently employ about 200 people (See Table 1).

TABLE 1
AVERAGE YEARLY EMPLOYMENT

Year	1	2	3	4	
Construction	309	1138	1248	798	
Permanent				36	
Year	**5**	**6**	**7**	**8**	
Construction	666	580	682	168	
Employment	102	108	108	200	etc.

Source: Basin Electric Power Cooperative for Antelope Valley Station.

Coal Preparation, Storage, and Handling

Lignite coal would be transported from a nearby mine to a three-day live storage pile or a sixty-day dead storage pile. From the live storage pile, the coal would be sent by conveyor to be crushed before being transferred to the plant silos for intermediate storage. Finally, coal would be conditioned before being introduced into the furnace for ignition. A typical plant would burn an average of approximately 800 tons of coal per hour or about 5.5 million tons per year. See Figure 2.

Power Generation

In a coal fired electric power plant, the crushed coal is combined with air supplied by forced-draft fans and then ignited and burned in the boiler furnaces. The combustion in the boiler furnace produces heat which creates steam from feed water entering the boiler heat-exchange system. After releasing energy through expansion in the high-pressure section of the turbine, steam is returned to the boiler for reheating. After being reheated, steam is returned to the intermediate section and subsequently to the low-pressure section of the turbine. Spent steam passes through the condenser where waste heat is removed, and the condensed liquid is returned to the boiler feed water system. Combustion gases from the furnace are exhausted to the atmosphere through the pollution control devices. Steam energy is converted to mechanical energy by the turbine and subsequently transformed into electrical energy by the generator. Generated power is routed through the main transformer for voltage step-up and then to a switchyard and transmission line system for distribution.

Water System

The water for the power plant systems would come from a nearby river or impounded water source. Raw water would be processed to reduce hardness and alkalinity. The treated water would then be stored for use. Demineralization of the filtered water for boiler makeup will be necessary to provide water of the required quality for the steam generation system. There will be several holding ponds included at the facility to store recoverable water.

The power plant will require approximately 13,000 acre-feet of water annually. The plant would use about 9,000 gallons per minute when in operation.

Cooling System

The cooling system for the electric power facility would be mechanical-induced draft wet-type cooling towers. Cooling tower blowdown would be sent to a holding pond to be used for ash sluicing, scrubbers, or coal dust suppression.

Emissions and Pollution Control

Burning lignite in the boiler produces gaseous emissions, fly ash, and bottom ash. The gas from the boiler will pass through a fabric filter baghouse and an SO_2 dry scrubber, and will be dispersed by a 600-foot stack (See Table 2).

TABLE 2
AIR EMISSIONS (lbs/hr)

Particulate	Sulfur Dioxide	Nitrogen Oxides
375	7530	5640

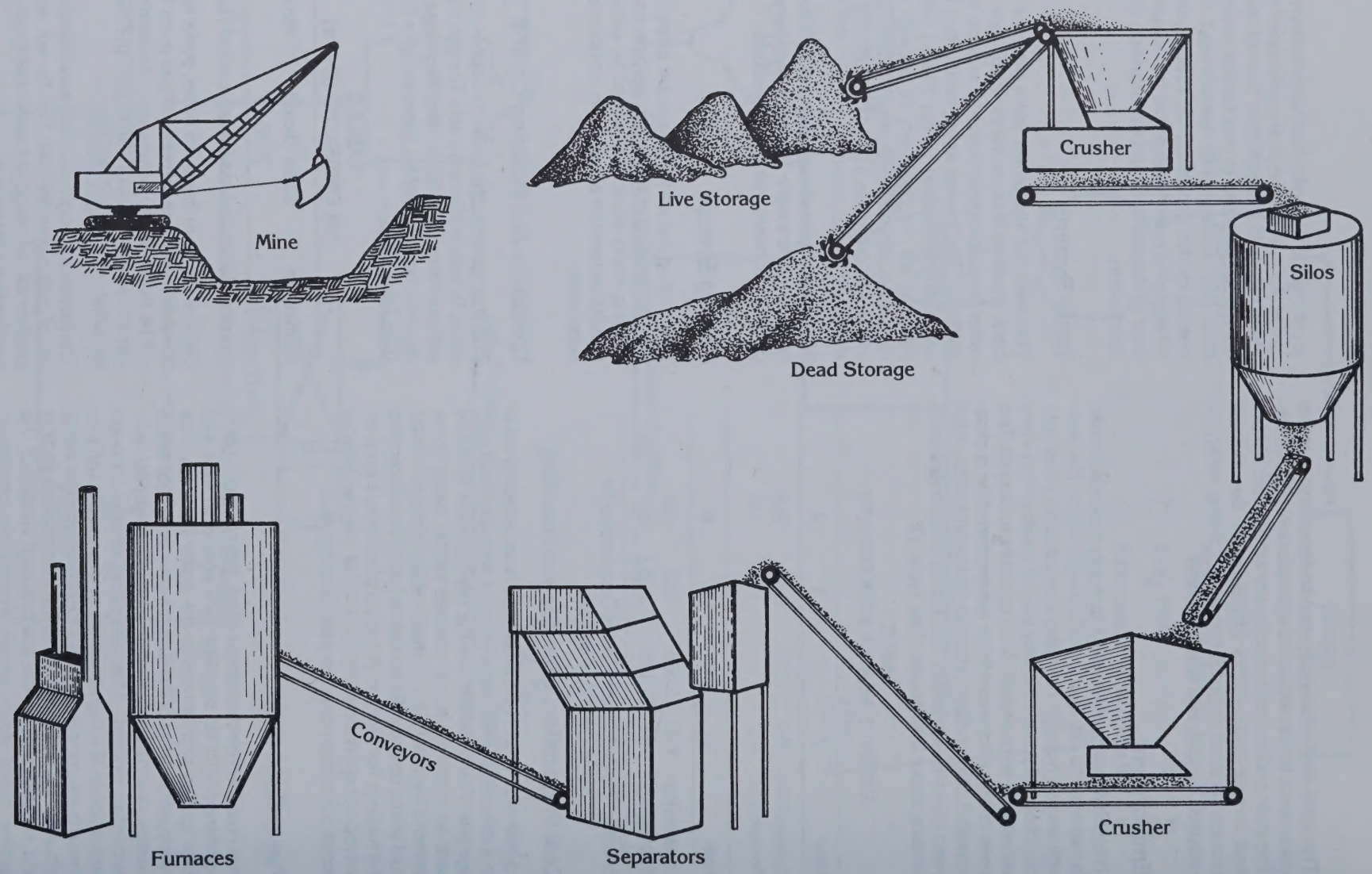
Source: North Dakota Department of Health.

Bottom ash from the main boiler, pyrite rejected from the pulverizer, and ash discharged from the hoppers will be hydraulically conveyed to dewatering bins. The ash will then be loaded into trucks and transported to the adjacent mine for disposal.

The fabric filter baghouse will be installed for the removal of particulate fly ash. The fly ash and scrubber product will be mixed with water and loaded into trucks for disposal in the mine.

Figure 2

COAL HANDLING SYSTEM



The plant will include a dry scrubbing system to absorb SO_2 from the flue gas. The scrubber product will be treated prior to disposal with dry fly ash. The fly-ash/scrubber product would likely be blended with water for dust control and stabilization. Emission of nitrogen oxides will be controlled by designing the boiler for proper mixing and flame quenching. The quantity of wastes would be approximately 80 tons per hour of fly-ash/scrubber product and 10 tons per hour of bottom ash.

Utility and Transportation Corridors

Water will be pumped from the water source to a surge pond. The water pipelines will require a right-of-way consisting of a 100 foot wide construction easement and a 50 foot wide permanent easement. The surge pond would have a water surface area of approximately 42 acres and would contain 1,050 acre-feet of water. Transportation corridors will be required for roads and a railspur. The transmission line leaving an electric power facility would be a 500 KV line with a right-of-way 150 feet wide connecting with an existing system.

PART II
RELATIONSHIP OF TRACT AND FACILITY

The Truax tract lies about three miles north of the town of Hazen, North Dakota. The tract consists of 23,460 acres of land with recoverable coal reserves of 282.8 million tons.

The likely use of coal mined from the tract would be for an electric power generating plant. To consider the impacts of this coal facility, it is assumed that the typical electric power facility described in Part I would be constructed adjacent to or near the tract with no specific site designated, except for purposes of air quality analysis.

Soils, Vegetation and Agriculture

In the Truax tract area, the agricultural land consists of approximately 56 percent cropland, 8 percent hayland, and 36 percent rangeland. Based on 1978-1979 county averages determined from ASCS data and from BLM grazing files annual production per acre would average 27 bushels per acre of wheat, 1.5 ton per acre for hayland, and .5 AUMs per acre for rangeland.

Assuming the same agricultural land use distribution for the 600 acre disturbance estimated for a generic electric power facility, agricultural production lost on the facility site would be 8,100 bushels of wheat annually, in a worst case situation analysis, for the life of the facility.

A short-term disruption of 12 acres per mile would result during construction of an undetermined length of water pipeline. Roadways would disturb 14.5 acres per mile. A railroad spur, also of undetermined length until final siting of the facility would eliminate agriculture on 18 acres per mile for the entire life of the facility.

Erosion losses due to wind and water from ground disturbed during the construction phase of the facility, given State permitting stipulations, would not be significant. Regionally, the agricultural production lost on the 600 acre facility site also would not be significant. Because of the alkaline soils in the tract area and downwind, no deleterious acid-forming effects to the soil due to acid rains from the facility would be anticipated.

There is evidence documented in the literature (West-Central North Dakota Regional Environmental Impact Study on Energy Development 1978) that there are potential negative impacts to vegetation and to livestock downwind from such a facility due to nitrogen oxides, sulfur dioxide, and particulate matter. Such negative impacts would be analyzed in detail at such a time as more specific information becomes available in conjunction with facility permit application with the State permitting authority.

Water

Water requirements for an electric power generating facility are approximately 9,000 gallons per minute or 13,000 acre-feet per year. The likely source of water for industrial use is Lake Sakakawea. Withdrawal of water would have no significant impact upon the reservoir. Facility wastes of ash, sludge, and water disposed of in the mine do have the potential to degrade water quality if they are disposed of within the saturated zone which develops upon reclamation. Present regulations require state approval of disposal sites.

Land Use

Changes in land use include displacement of existing use, increased intensity of existing uses, and the introduction of new uses. The site of the facility is likely to displace agricultural use.

The optimum site conditions for facilities are the same as for agriculture; that is, gentle topography and soils with good drainage characteristics. The increase in population of communities results in demand for new housing, additional commercial development, and expanded public use facilities. The area of this development will likely be on off-site agricultural land. The on-site displacement of agricultural land use is discussed in the Agriculture section of this report.

Increased population would create a demand for community services as addressed in the Social and

Economic Conditions section of this report. This demand implies a need to expand existing facilities and commercial establishments or to create new ones. Existing commercial establishments may suffer through the construction of new facilities outside the downtown areas. Public services would be stretched in the short term by lack of capital to implement change due to increased population. Parking shortages, traffic congestion, and excessive wear and tear on roadways would make downtown areas less habitable. Municipal organizational structures and physical space may prove inadequate with increased population. For example: a part time mayor may be overworked, processing of permits may delay private building construction, and filing space for public records may prove inadequate.

With the influx of workers and their families, a change in the composition of the community is inevitable and demands for new forms of public and commercial facilities for shopping, recreation, and entertainment would ensue. These types of changes are likely to result in dissatisfaction by both the existing resident population and the newcomers. Conflicts are likely to occur as a result of the contrast in the lifestyles of these populations.

Existing planning varies considerably from community to community. Some are prepared for change presaged by recent oil and gas development in some areas, while others are ill prepared for the change in population anticipated.

Current perception of county residents with regard to roads, retail opportunities, recreational/entertainment facilities, and housing are discussed in detail in Chapter 2 of the Site Specific Analysis for Economic and Social Conditions.

Similarly, forecasts by city/county planners regarding likely changes in community services resulting from facility related population growth are presented in detail in the Economic and Social Conditions section of this report.

Recreation

Recreation in the tract vicinity is limited to dispersed big game hunting. Although there are some facilities in the tract vicinity, those existing regional recreation facilities (community camping and picnic areas, Theodore Roosevelt National Memorial Park, and Lake Sakakawea) are expected to receive the majority of recreation demand. The regional EIS will address in more detail the expected regional demand from increased population for recreation.

Wildlife/Fisheries

Impacts of an electric power facility on wildlife around the Truax tract could occur in two areas: 1) impacts from destruction of habitat and 2) direct and indirect impacts from the increase in human population.

The removal of vegetation for a 600 acre electric power facility and the expansion of urban areas, highways, and railroads would prevent or reduce the use of an area by wildlife regardless of the type of vegetation removed. Much of the area around the tract contains native prairie, wetlands, and some shrublands essential to many species. Careful siting of the facility would limit the destruction of these areas.

If powerlines, pipelines, access and haul roads are constructed in key wildlife areas, partial or total destruction of habitat would occur depending on the magnitude of development. The worst case would destroy present wildlife populations in the area. Wildlife oriented recreation such as hunting and wildlife observation would have to be sought elsewhere. Wildlife would be impacted by eagle electrocutions on powerlines, migratory bird mortality from striking powerlines close to wetlands, road kills along transportation routes through important wildlife areas, harassment of wildlife by off-road vehicle use, increased poaching, and habitat destruction.

Poaching and road kills have increased dramatically in areas of North Dakota, Montana, Wyoming, and Colorado where energy development has occurred. The problem is compounded in areas where transportation corridors are located in important wildlife areas and shift changes coincide with wildlife feeding periods. This situation could occur in the Truax tract area.

The impact to wildlife could be mitigated by: 1) siting the electric power plant and associated facilities with regard for essential wildlife areas, 2) adjusting work shifts to avoid feeding times of highly visible wildlife, 3) mass transportation of employees, 4) providing funds to State fish and game agencies to better control illegal shooting of wildlife, and 5) adopting a poaching clause in union contracts.

Taking water from shallow bays in Lake Sakakawea could have significant adverse impacts. These areas are prime nursery and spawning areas for sport, commercial, and forage fish. Taking water from deeper noncritical areas of the reservoir could reduce or eliminate the significant impacts to fisheries. The cumulative increases in industrial, urban, and other water uses will dictate the severity of the impacts on fisheries. The cumulative impact will be addressed in the regional EIS to be prepared.

Cultural Resources

The Truax tract area has not been inventoried to date. Information from existing inventories (BLM unpublished data, Davis 1976; Greiser 1980) outside the Fort Union coal region suggests that the predominant prehistoric sites should be lithic scatters of varying size,

density and function (ca. 70-80%). Other expected prehistoric resources include stone circles (ca. 10%-20%), ceramic-bearing sites, rockshelters, and kill sites (ca. 10% combined). Expected historic resources include homestead and ranching remains (ca. 50%), historic grafitti and rock art (ca. 20%), freight roads, dugouts, cairns, trading posts, burials and battle sites (ca. 30% combined). Further information on cultural resource occurrence, distribution and significance cannot be quantified prior to inventory.

Visual Impacts

Central North Dakota has very high but common visual quality. In the absence of other types of visual experiences, the landscape is not highly valued as scenery because of the vast distances involved in crossing this relatively uniform area. Most highways roll with the landform so views alternate between nearby features at low points and panoramas of up to thirty miles at high points in the roadway profile. The landscape is seen in terms of these short vistas of landscape elements that will not be seen again, and short duration views of distant landscapes in which any vertical object or landscape feature serves as a focal point.

Large structural features in the central North Dakota landscape contrast with the landscape both in terms of the visual surface (the character of what is seen) and in terms of function. Vertical and linear components of a facility, because of hard architectural edges of the structures, and the transitory nature of panoramic views imply a visual importance of these large objects for orientation. The aesthetic response is secondary to this visual function.

Neglecting cultural bias, the aesthetic response to stark architectural lines and pure planes of color contrasting with the simple curvilinear landforms of the countryside can be considered positive. This visual experience would be immediately comprehensible and would provide relief from a relatively uniform countryside. Beyond this initial response, however, are responses with origins in cultural bias and the individuals' relationships to the land. The greatest effect would be upon local residents with memories of the existing landscape to use as a comparative basis of judgment. If no attachment to the existing landscape is present, the facility would be judged more on its quality than on cultural bias.

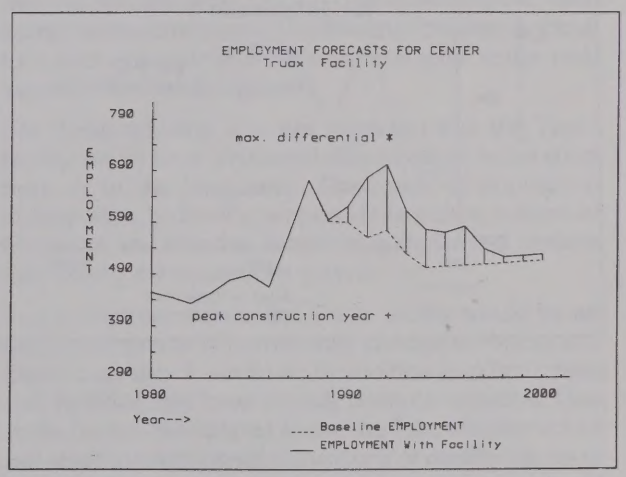
The visual impact would be the penetration of the skyline by the facility in views from communities and major transportation corridors. The 600-foot stack could potentially be seen thirty or more miles away. Powerlines originating at the site would have more extensive consequences. Consideration for corridor planning related to the placement of facilities is essential to maintain visual quality in the region. The facility would be highly visible and would demand a response either positive or negative. The dominance of the facility in the landscape could be perceived as a loss of amenity through impairment of the landscape as it now exists for the forty years of the facility's expected life.

Economic and Social Conditions

Construction and operation of the Truax facility would result in significant impacts upon services in some communities within the area as a result of population growth associated with employment opportunities. Figure 3 shows forecasted community employment and population levels through the year 2000 both with and without development of the facility. As these figures show, Center, Golden Valley, and Stanton, North Dakota would experience increases in both population and employment as a result of development of the facility.

Changes in regional personal income from facility development are expected to be insignificant through the year 2000. The communities in which the workers and their families reside would experience some increases in economic activity as a result of employee payroll expenditures and through company expendi-

FIGURE 3



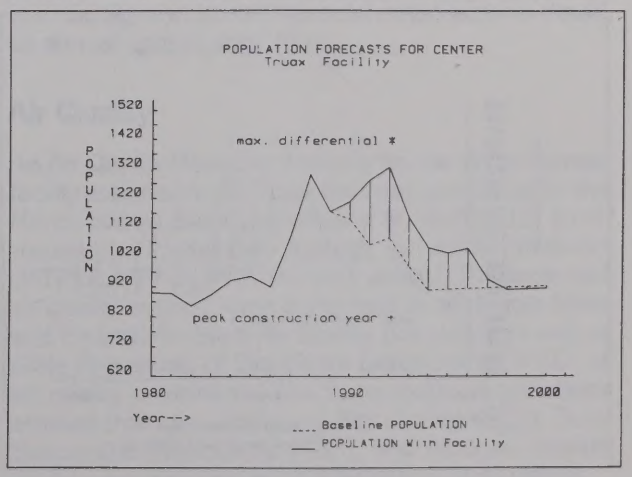
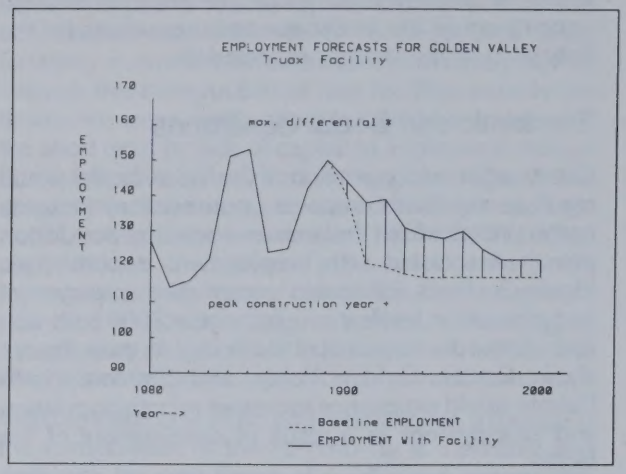
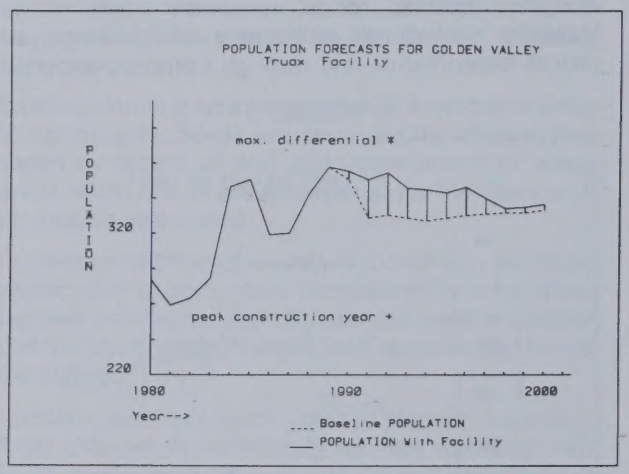
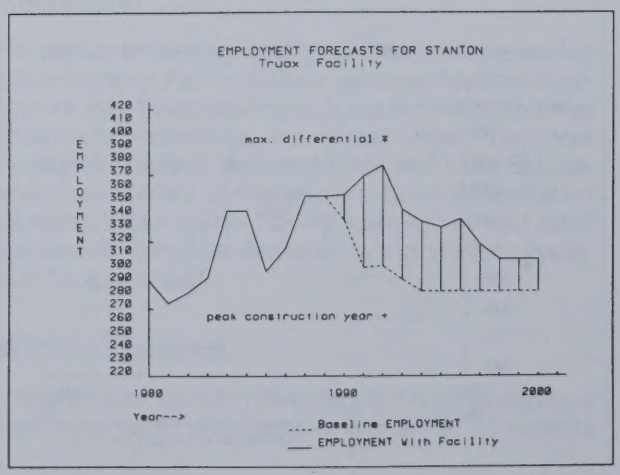
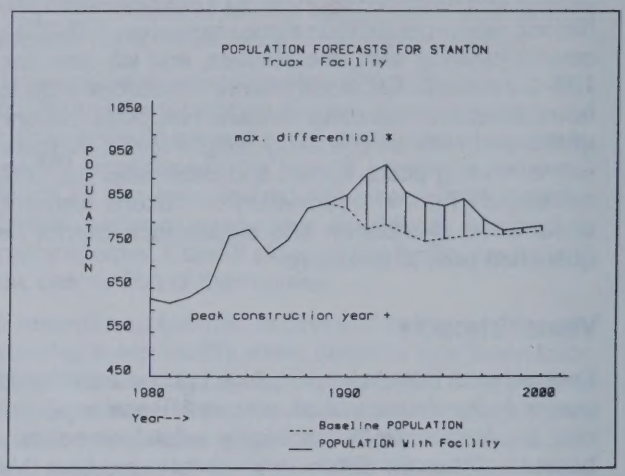


FIGURE 3 (continued)







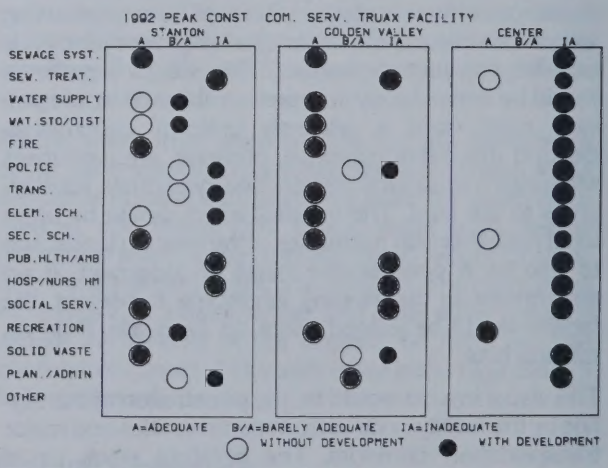


SOURCE: Mountain West Research, Inc., 1981.

tures for goods and services during the construction and operation phases. The Truax facility is forecasted to boost regional personal income by a maximum of 2.2 percent over baseline values by 1992 as a result of expenditures associated with the construction phase of this facility.

Peak employment during the construction phase of the facility is expected to occur in 1992 at 1248 employees with full operations employment expected in 1999 at 200 employees. Using these two years as the first primary impact dates, it is estimated that the above communities would experience an inadequate level of one or more community services as a direct result of the 1992 peak construction employment/population levels associated with construction of the facility (Figure 4).

FIGURE 4

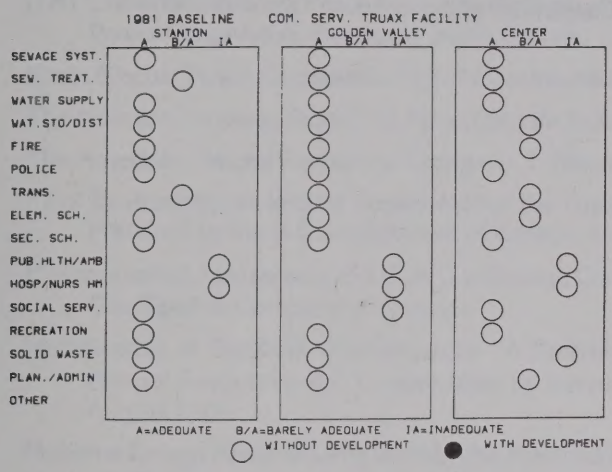


SOURCE: Respective city/county or regional planners.

Population associated with full operation (i.e., 1999 and beyond) of the Truax facility is not expected to cause services in any of the communities to be thrown into an inadequate situation as a result of tract development. However, Center, Golden Valley, and Stanton would

experience inadequacy of several community services by 1999 even without facility development. Development of the Truax facility would add to the problems expected to occur. For comparison purposes, Figure 5 shows current (1981) community service adequacy assessments for impacted communities.

FIGURE 5



SOURCE: Respective city/county or regional planners.

The adequacy ratings appearing in Figures 4 and 5 reflect assessments by either city-county or regional planners for the communities involved and constitute the planners' best judgments concerning the fiscal (revenue/cost) situation likely to be encountered by the communities in 1992 and 1999.

It appears that a strong majority of residents in Mercer and Oliver counties support the construction and operation of additional facilities in the area. Twenty-two persons were interviewed by BLM representatives in Mercer and Oliver counties and well over two-thirds of these people expressed support. (However, in Oliver County, only six residents were interviewed so considerable caution should be used in interpreting these results). Since Mercer and Oliver counties already have several power plants in operation it appears that local residents have generally come to accept or endorse the siting of these facilities in the area.

Officials in Mercer and Oliver counties were even more favorable toward a new facility or facilities than were persons in the general population. There was unanimous support among the officials, with a single exception of a Mercer County official who was uncertain toward the costs and benefits of such plants.

Mercer and Oliver County residents would not share equally in the benefits and costs of a Truax-based facility. Some persons would be unable or unwilling to participate in the expanded economic activity and employment opportunities, both direct and indirect, of such a plant. These persons would, however, have a changed community with which to deal on a day-to-day basis. Other persons (qualified or potentially qualified to acquire an energy-related job, local retailers, and persons outside the labor force desiring entry) would financially benefit from the construction of the facility. Thus, some residents would, in the future, resent the siting of the plant in their locality, while others would endorse it.

A Truax facility would, at least for the short term, have some effect on the ongoing social processes of Mercer and Oliver counties. The communities of Beulah, Hazen, Stanton, and Center would, at least during the short term, have a more complex social environment. Since the social environment is the most widely appreciated aspect of life in these areas today, there would be some dissatisfied residents due to the Traux facility's construction.

In absolute terms, much of the population effects of the proposed Truax facility would fall, both in the short term and the long term, in the Bismarck-Mandan area. However, these communities have fairly broad population bases at present. In relative terms, the most significant effects would be in Beulah, Hazen, Stanton, and Center. During the peak of the construction period, these communities would have roughly twenty percent more residents than would be expected without development. Both Mercer and Oliver counties have experienced and are experiencing coal development, have some measure of economic diversity (between agriculture and energy), and have experienced some coal development related growth.

For these reasons, it is not expected that the Truax facility would have profound effects, either in the short term or in the long term. The levels of population change attached to the proposed plant area, outside of Bismarck and Mandan, would be quite limited, particularly during the operations phase.

In a cumulative sense, the Traux facility would be an additional source of community change in Mercer and Oliver counties. It would be in addition to other mines and facilities that have already been constructed. Due to the factors mentioned above the Traux facility would not result in widespread disruptions or disallocations of community resources. The social consequences would be almost entirely short term.

Air Quality

An Air Quality Modeling Analysis[1] of the electric power facility assigned to the Truax tract was conducted by the North Dakota State Department of Health. U.S. Environmental Protection Agency guideline models[2] (MTPER, PTPLU, PTMAX) were utilized. The projected air quality impacts were compared to applicable State and Federal Ambient Air Quality Standards as well as State Prevention of Significant Deterioration (PSD) of air quality increments. The three major air pollutants emitted from the facility—sulfur dioxide (SO_2), Total Suspended Particulates (TSP), and nitrogen dioxide (NO_2)—were compared to the applicable standards.

The assigned electric power facility was shown to comply with all State and Federal Ambient Air Quality Standards. It was also found to be in compliance with all State PSD increments.

[1]Guidelines for Air Quality Maintenance Planning and Analysis Volume 10 (Revised): Procedures for Evaluating Air Quality Impact of New Stationary Sources, EPA-450/4-77-001, October 1977, (OAQPS No. 1.2-029 R), U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina 27711.

[2]Guideline on Air Quality Models, EPA-450/2-78-027, OAQPS No. 1.2-080, April, 1978, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina 27711.

LIST OF SOURCES FOR THE PRELIMINARY FACILITY EVALUATION REPORTS

ITAT Construction Work Force Report for February 1981; Inter-Industry Technical Assistance Team, Basin Electric Power Cooperative, Bismarck, North Dakota.

Basin Electric Power Cooperative; 1717 East Interstate Avenue, Bismarck, North Dakota 59501.

The Nokota Company; Suite 112, Provident Life Building, Bismarck, North Dakota 58501.

The American Natural Resources Company, 1 Woodward Avenue, Detroit, Michigan 48226.

Final Environmental Impact Statement for the Great Plains Gasification Project, Mercer County, North Dakota. Prepared by the U.S. Department of Energy. August 1980.

Environmental Assessment of a Coal Gasification Complex in Dunn County, North Dakota. Prepared by the Natural Gas Pipeline Company of America.

Identification of Synthetic Fuel Impacts: A Preliminary Assessment. Prepared for the Montana Department of Natural Resources and Conservation by teams at the University of Montana and Montana State University. August 1980.

Montana Energy Almanac. Prepared by the Montana Department of Natural Resources and Conservation. October 1980.

West-Central North Dakota Regional Environmental Impact Study on Energy Development. Prepared by the U.S. Department of the Interior, Bureau of Land Management and the State of North Dakota. October 1978.

North Dakota State Department of Health; Bismarck, North Dakota.

Montana Department of Natural Resources and Conservation; Helena, Montana.

The Tenneco Coal Gasification Company; P.O. Box 491, Glendive, Montana 59330.

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